**SWAN, HUNTER, & WIGHAM RICHARDSON LTD.**

M.S. TORINIA

SHIP No. 1561.

Swan Hunters No 1561

Profile & Decks
as Built

"s.s Torinia"

NEWCASTLE ON TYNE.

Report No. 97101

W1150-0149

# Nos 1561 & 3 SHIPS.

## PROFILE & DECKS.

DIMENSIONS :- 500'-0" L.B.P. × 64'-3" B. MLD. × 37'-0" D. MLD.

SCALE :- 1/8" = ONE FOOT.

ALL SECTIONS ARE N.B.S.

DOUBLING PLATES ON "A" & "C" STRAKES, P & S, IN WAY OF TRANSVERSE BULKHEADS. 5'-0" LONG × ·60" THICK. WHERE MARKED "D".

INTERCOSTALS FITTED TO BOTTOM SHELL, BETWEEN THE LONGITUDINALS IN Nos 9 & 10 CENTRE TANKS, WHERE MARKED THUS ✓, IN LIEU OF TAPERING THE SPACING OF LONGITUDINALS.
3½" × 3½" × ·44" BACK BARS FITTED TO BOTTOM LONGITUDINALS FORWARD OF ½L ON FLAT OF FLOOR.
DOUBLE 6" × 6" × ·44" ANGLES FITTED TO BOTTOM SHELL & TRANSVERSE FLOORS IN Nos 9 & 10 CENTRE TANKS.
THREE BOTTOM STRAKES OF SHELL NEXT KEEL ARE INCREASED IN THICKNESS FROM ½L FORWARD TO RULE POSITION OF COLLISION BULKHEAD.

DATE 19. 5. 39
132

MESSRS. SWAN, HUNTER & WIGHAM RICHARDSON, LIMITED. BUILDERS OF SHIPS, ENGINES & FLOATING DOCKS. WALLSEND-ON-TYNE. YARD Nos 1561 & 3.

W150-0149

W1150-0151

~~(24~~ 22

Swan Hunters Nos 1561 & 3

Upper Deck

RETAIN

s.s "Tonina"
NEWCASTLE ON TYNE.
Report No. 97701.

RETAIN

# Nos 1561-63
# UPPER DECK
SCALE 1/4" = 1 FOOT

SECTION THRO' DECK
SCALE:- 1/2" = 1 FOOT.
STRINGER ANGLE 8" × 8" × .67" FOR 1/2 LENGTH.
76" × .84" STRINGER PLATE.
PORT & STBD.
PORT ONLY.
DECK LONGITUDINALS 9" × 3 1/2" × .43" B.A.s N.B.S. MARKED U.D.L.
DECK LONGITUDINALS 9" × 3 1/2" × .43" B.A.s N.B.S. SPACED 32" APART MARKED U.D.L.
LONGITUDINAL BULKHEAD 18'-4" FROM ℄ (P & S)
CENTRE GIRDER 66" × .40" WITH 6" × 3 1/2" × .50" O.A. FACE BAR
5" × 3 1/2" × .40" O.A. STIFFS
ELEVATION OF GIRDER ON CENTRELINE
No 4 TANK
No 5 TANK
No 6 TANK
No 7 TANK
No 8 TANK
No 9 TANK
No 10 TANK
FORWARD PUMP ROOM
BRACKETS TO LONGITUDINALS
BRACKETS IN WAY OF O.T. HATCHES AT BHDS 99 AND 123
STRINGER BAR SET IN FOR SHELL PLATING
BOILER CASING
MOTOR CASING
No 1 TANK
No 2 TANK
No 3 TANK
No 4 TANK
No 5 TANK
No 6 TANK
No 7 TANK
No 8 TANK
No 9 TANK
No 10 TANK
SPACED 24" APART.

RIVETING IN GIRDER AT CENTRE LINE
TOP ANGLES BOTH FLANGES 7/8" RIVS SPACED 4 3/8" CR TO CR
FACE ANGLE TO GIRDER 7/8" " " 5 1/4" " " "
VERTICAL STIFFENERS TO GIRDER 11-7/8" RIVS IN EACH 5 1/2" " " "
CONNECTIONS TO TRANSVERSES & BULKHEADS AS SHOWN IN ELEVATION

SWAN, HUNTER, & WIGHAM RICHARDSON LTD.
SHIPBUILDERS & ENGINEERS
DATE 14/7/38
PLAN No. S.101
WALLSEND SHIPYARD
WALLSEND-ON-TYNE.

W1150-0150

SWAN, HUNTER, & WIGHAM
RICHARDSON LTD.
SHIP No. 1561.

M.S. TORINIA

Swan Hunter's No 1561

Midship Section
as Built

RETAIN

RETAIN

© 2021
Lloyd's Register
Foundation

# Nos 1561 & 3 SHIPS.

# MIDSHIP SECTION.

SCALE :- 1/2" = 1 FOOT.

TO CLASS LLOYDS 100 A.1. ✱ "CARRYING PETROLEUM IN BULK."

SPECIAL NOTATION "LONGITUDINAL FRAMING BOTTOM & DECK."

DIMENSIONS :- 500'-0" L.B.P. × 64'-3" B. MLD × 37'-0" D. MLD

## LLOYD'S NUMERALS.

L = 500    B. = 64·25.    D. = 37.

L. × D = 500 × 37 = 18500.

L × (B + D) = 500 × (64·25 + 37) = 50625.

L/D = 500/37 = 13·51.

ALL SECTIONS ARE N.B.S.

## EQUIPMENT NUMBER.

| | | |
|---|---|---|
| L × (B + D) | | = 50625 |
| POOP | 106·2 × 7·5 × ·75 | = 597 |
| BRIDGE | 46·69 × 7·5 × ·75 | = 263 |
| FORECASTLE | 56·83 × 7·5 × ·75 | = 319 |
| BRIDGE HOUSE | 42·71 × 7·5 × ·5 | = 160 |
| UPPER BR. " | 42·71 × 7·5 × ·5 | = 160 |
| CAPTAIN'S " | 42·71 × 7·5 × ·5 | = 160 |
| CASINGS ON POOP | 90·67 × 7·5 × ·5 | = 340 |
| | | 52624 |

## EQUIPMENT.

3 BOWER ANCHORS 86 CWTS. EACH. STOCKLESS.

1 STREAM ANCHOR 26½ " EX. STOCK.

300 FTHS 2 10/16" STUD CHAIN CABLE.

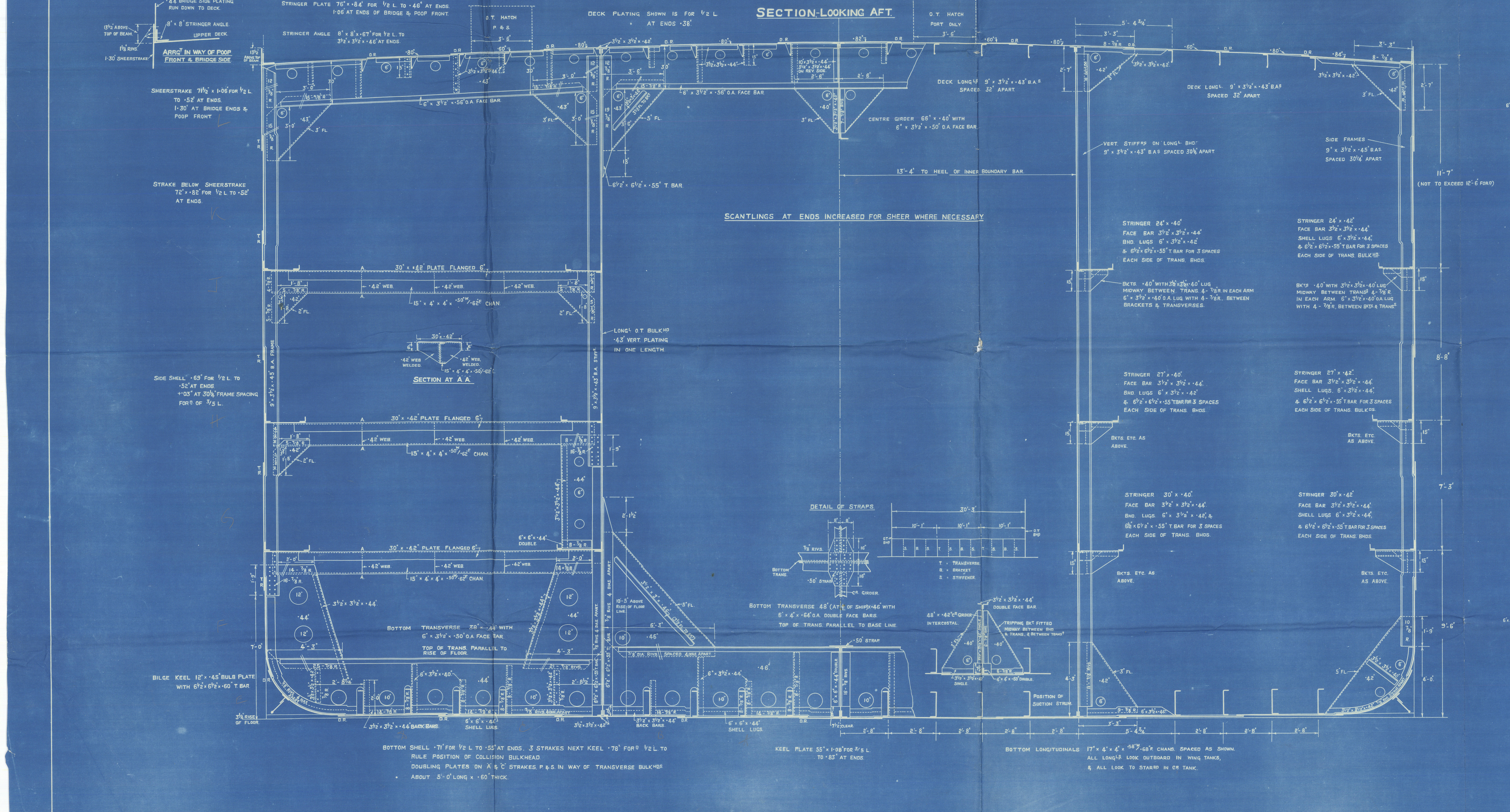
120 FTHS 5" S.F.S.W.R. (6 × 24) STREAM WIRE.

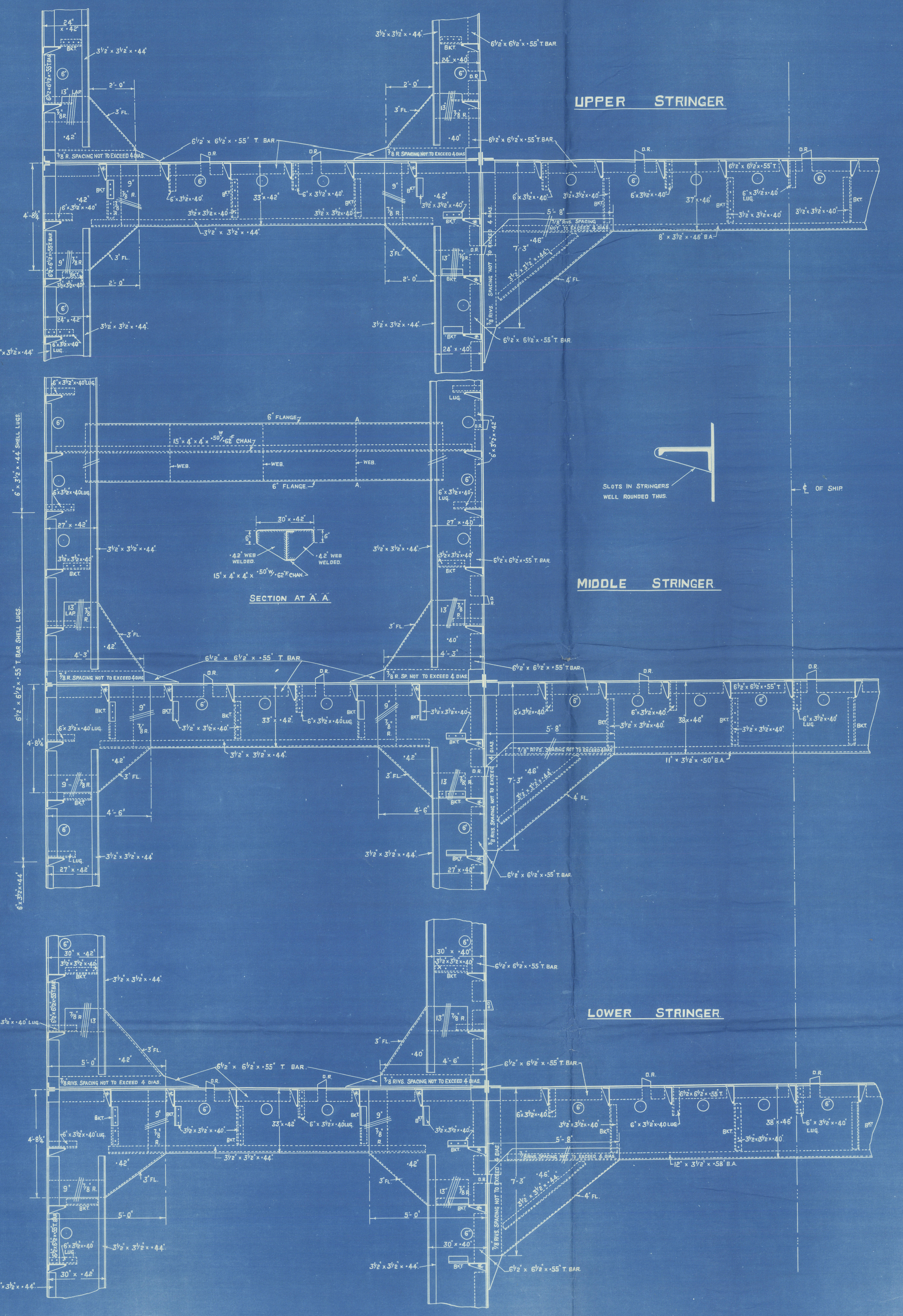
130 " 5½" " " TOW LINE.

2 - 100 FTHS 3¼" F.S.W.R. (6 × 12) HAWSERS } (RULE SIZE 2¾)

2 - 100 " 3¼" " " WARPS }

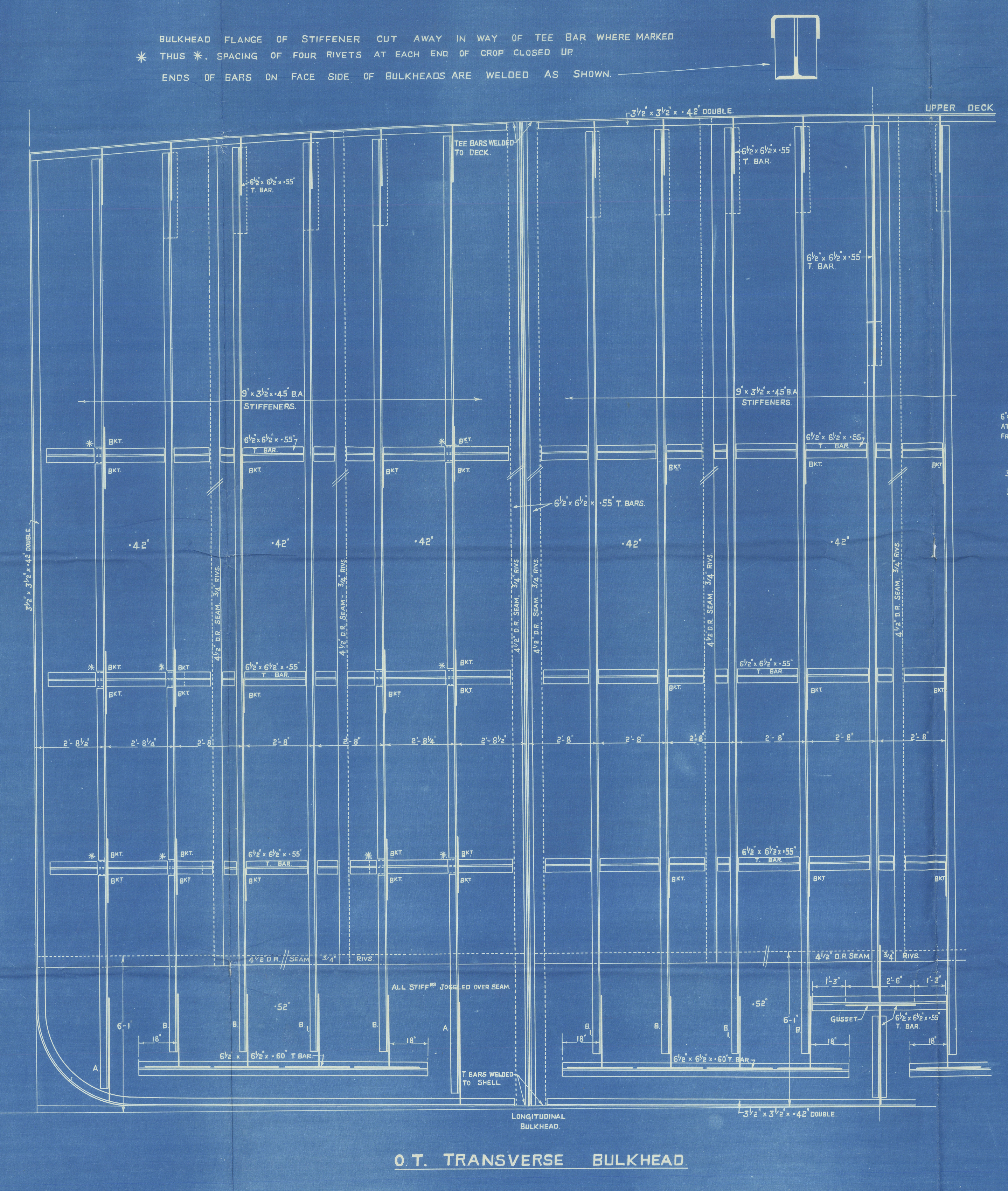
## SECTION-LOOKING AFT.


·44" BRIDGE SIDE PLATING RUN DOWN TO DECK.
13½" ABOVE TOP OF BEAM.
8" × 8" STRINGER ANGLE.
UPPER DECK.
STRINGER PLATE 76" × ·84" FOR ½ L. TO ·46" AT ENDS. 1·06" AT ENDS OF BRIDGE & POOP FRONT.
STRINGER ANGLE 8" × 8" × ·67" FOR ½ L. TO 3½" × 3½" × ·46" AT ENDS.
O.T. HATCH P. & S.
3'-6"
DECK PLATING SHOWN IS FOR ½ L. " AT ENDS ·38".
O.T. HATCH PORT ONLY
3'-6"
D.R.
SCANTLINGS AT ENDS INCREASED FOR SHEER WHERE NECESSARY.
SECTION AT A.A.
DETAIL OF STRAPS
ABOUT 5'-0" LONG × ·60 THICK.

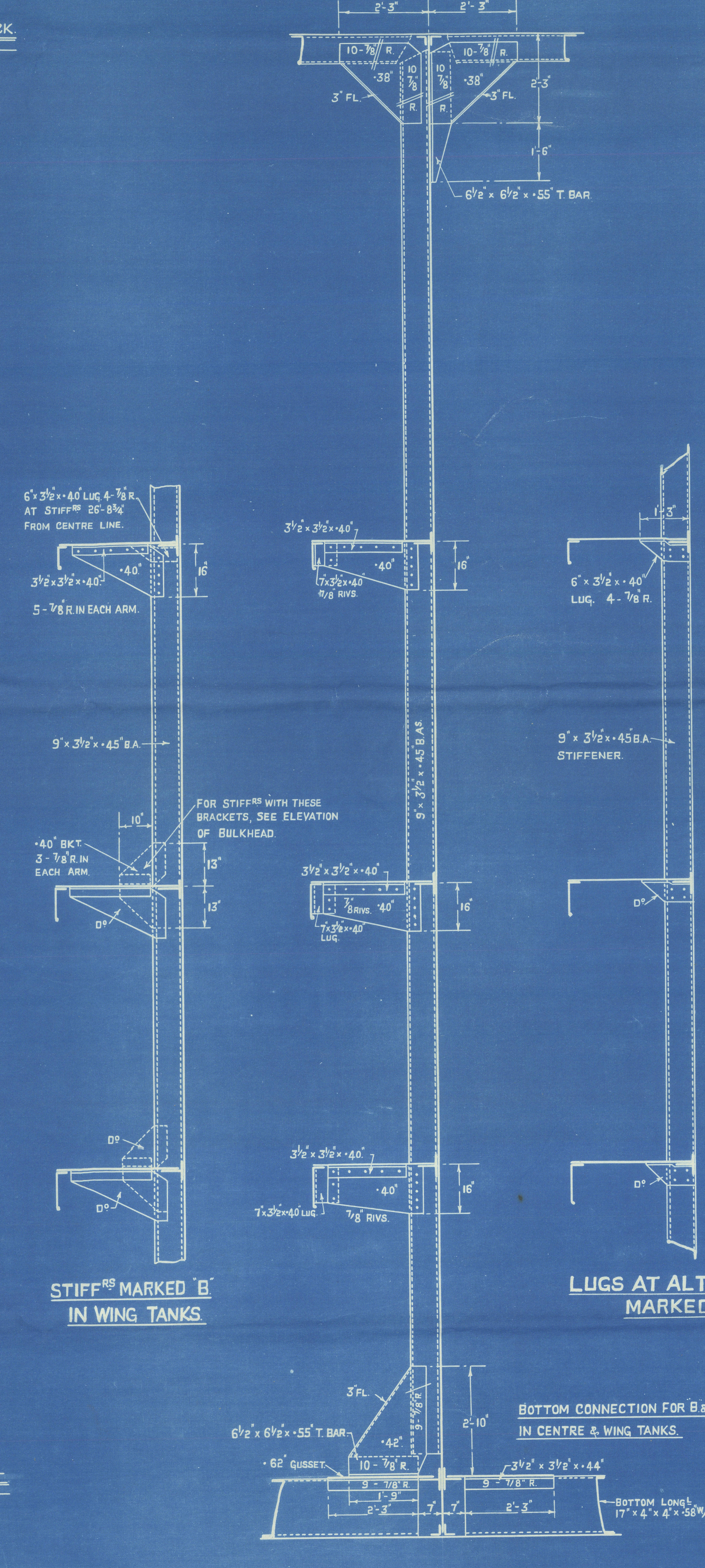


BULKHEAD FLANGE OF STIFFENER CUT AWAY IN WAY OF TEE BAR WHERE MARKED ✱ THUS ✱. SPACING OF FOUR RIVETS AT EACH END OF CROP CLOSED UP.

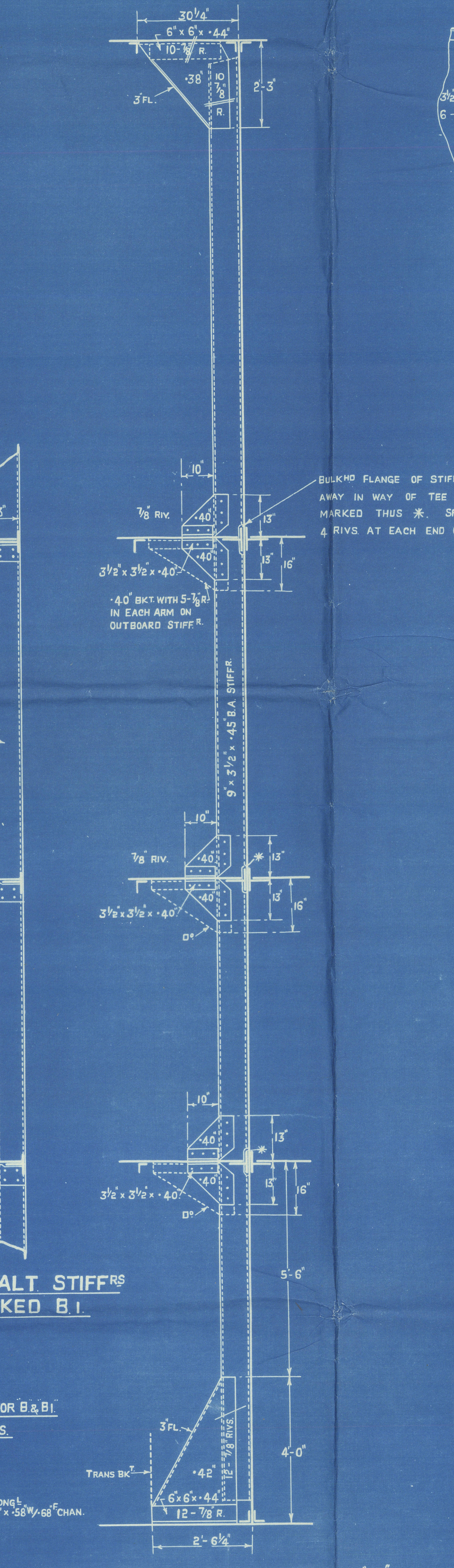
ENDS OF BARS ON FACE SIDE OF BULKHEADS ARE WELDED AS SHOWN.



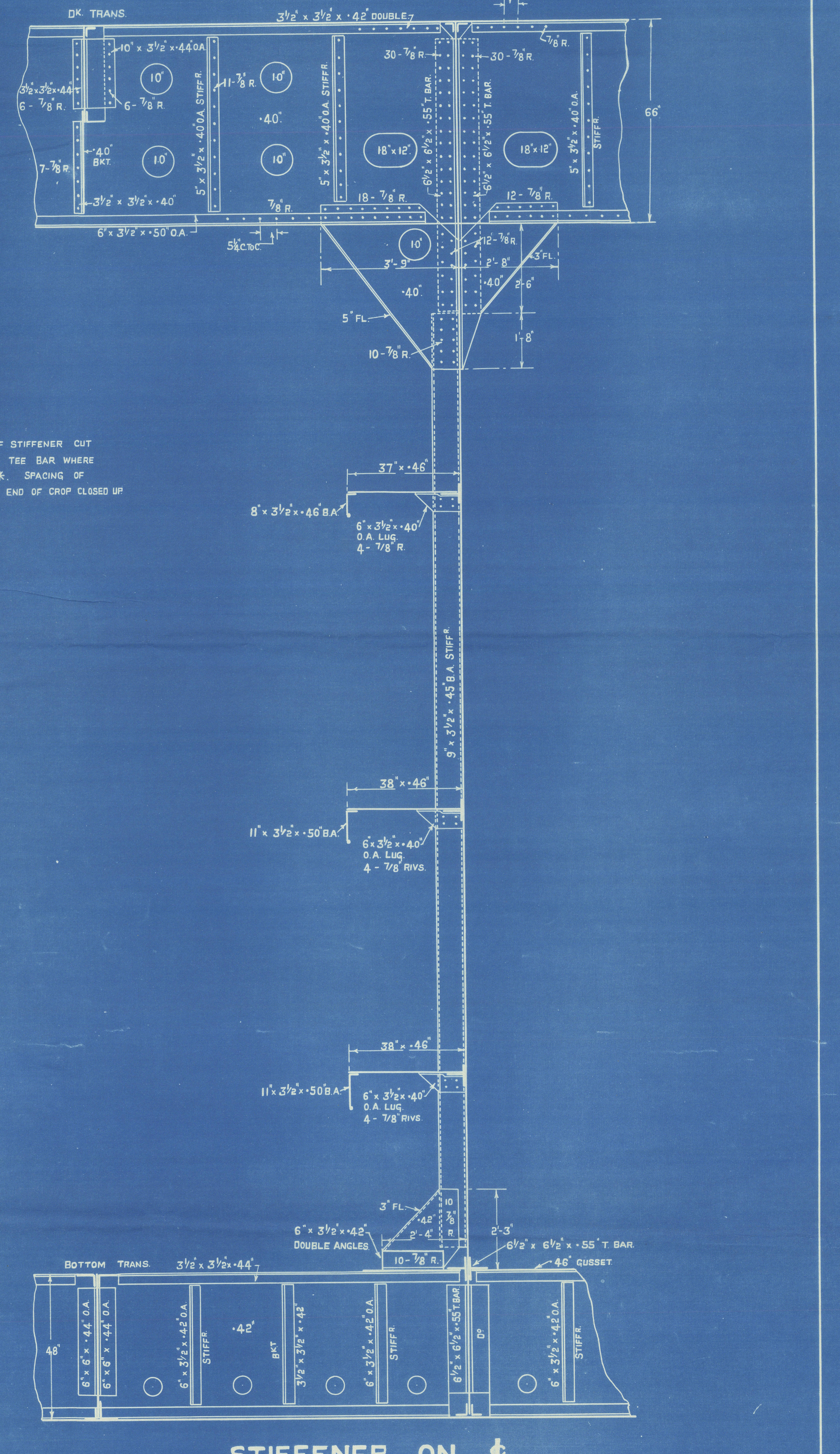
O.T. TRANSVERSE BULKHEAD


STIFFR MARKED 'B' IN WING TANKS.
LUGS AT ALT. STIFFRS MARKED 'B'.
BOTTOM CONNECTION FOR B & B1 IN CENTRE & WING TANKS.
6½" × 6½" × ·55" T. BAR
·62" GUSSET
10 - 7/8" R.
9 - 7/8" R.
3½" × 3½" × ·44"
BOTTOM LONGL. 17" × 4" × ·56"/·68" CHAN.

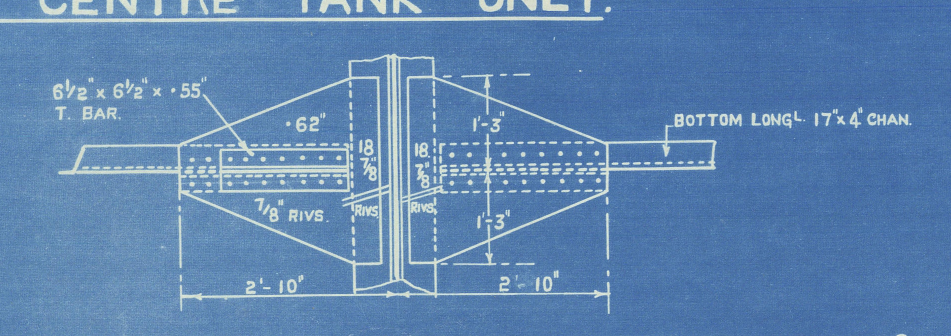
STIFFENERS MARKED 'B' IN CENTRE TANK ONLY.



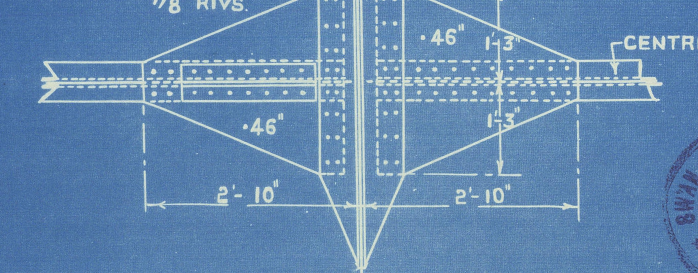
STIFFENERS MARKED 'A'.



STIFFENER ON ℄.



BULKHEAD STIFFR CONNECTION TO BOTTOM LONGLS



DETAIL OF GUSSET PLATES.

SWAN, HUNTER & WIGHAM RICHARDSON, LTD

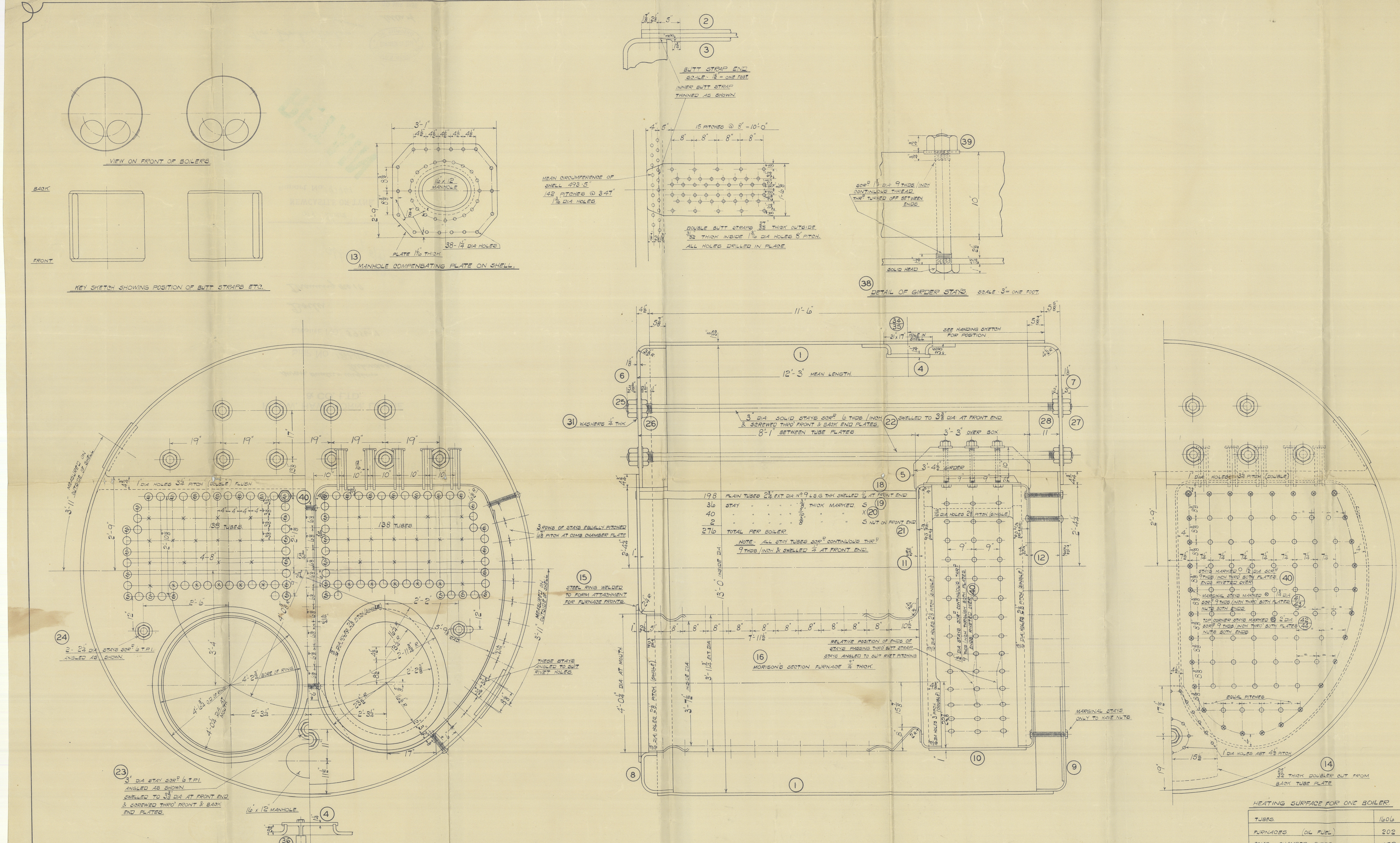
SWAN, HUNTER & WIGHAM RICHARDSON LTD. SHIPBUILDING DEPT. DATE 19-5-39 131 WALLSEND SHIPYARD WALLSEND-ON-TYNE

BUILDERS OF SHIPS, ENGINES & FLOATING DOCKS

WALLSEND SHIPYARD

WALLSEND - ON - TYNE

Nos 1561 & 3


VIEW ON FRONT OF BOILERS.
BACK
FRONT
KEY SKETCH SHOWING POSITION OF BUTT STRAPS ETC.
3'-1"
4½" 4½" 4½" 4½" 4½"
16" x 12" MANHOLE
PLATE 1 1/16" THICK.
38-1¼" DIA: HOLES
2'-9"
13
MANHOLE COMPENSATING PLATE ON SHELL.
2
3
BUTT STRAP END.
SCALE:- 1½" = ONE FOOT.
INNER BUTT STRAP THINNED AS SHOWN.
15 PITCHES @ 8" = 10'-0"
MEAN CIRCUMFERENCE OF SHELL 493·5"
142 PITCHES @ 3·47"
1 3/16" DIA: HOLES.
DOUBLE BUTT STRAPS 27/32" THICK OUTSIDE
31/32" THICK INSIDE 1 3/16" DIA: HOLES 8" PITCH.
ALL HOLES DRILLED IN PLACE.
39
SCR^D 1¾" DIA: 9 THDS./INCH CONTINUOUS THREAD.
THR^D TURNED OFF BETWEEN ENDS.
SOLID HEAD.
38
DETAIL OF GIRDER STAYS. SCALE:- 3" = ONE FOOT.
3'-11" MEASURED ON OUTSIDE OF SHELL.
1" DIA HOLES 3¼" PITCH (DOUBLE) FLUSH.
40
138 TUBES.
138 TUBES.
3 ROWS OF STAYS EQUALLY PITCHED 6⅞" PITCH AT COMB. CHAMBER PLATE.
15
STEEL RING WELDED TO FORM ATTACHMENT FOR FURNACE FRONTS.
24
2-2¼" DIA: STAYS SCR^D 6 T.P.I. ANGLED AS SHOWN.
4'-2¾" BORE OF RING.
4'-6 3/64" O.D. OF RING
4'-0¼" DIA: AT MOUTH
THESE STAYS ANGLED TO SUIT RIVET HOLES.
23
3" DIA: STAY SCR^D 6 T.P.I. ANGLED AS SHOWN. SWELLED TO 3⅜" DIA: AT FRONT END & SCREWED THRO' FRONT & BACK END PLATES.
16" x 12" MANHOLE.
4
36/37
11'-6"
34/35
21" x 17" HOLE IN SHELL
SEE HANDING SKETCH FOR POSITION
1
12'-3" MEAN LENGTH.
6
7
25
26
27
28
31 WASHERS ¼" THK.
3" DIA: SOLID STAYS SCR^D 6 THDS./INCH & SCREWED THRO' FRONT & BACK END PLATES.
22 SWELLED TO 3⅜" DIA: AT FRONT END
8'-1" BETWEEN TUBE PLATES.
3'-3" OVER BOX.
5
3'-4½" GIRDER
18
198 PLAIN TUBES 2¾" EXT. DIA: Nº 9 L.S.G. THK. SWELLED 1/16" AT FRONT END.
36 STAY " " " " 3/8" THICK MARKED. S 19
40 " " " " " 5/16" " " X 20
2 " " " " " 3/8" " " S NUT ON FRONT END. 21
276 TOTAL PER BOILER.
NOTE:- ALL STAY TUBES SCR^D CONTINUOUS THR^D 9 THDS./INCH & SWELLED ¼" AT FRONT END.
11
12
13'-0" INSIDE DIA:
7'-11½"
16
MORISON'S SECTION FURNACE 9/16" THICK.
RELATIVE POSITION OF ENDS OF STAYS PASSING THRO' BUTT STRAP. STAYS ANGLED TO SUIT RIVET PITCHING
1½" DIA STAYS SCR^D CONTINUOUS THR^D 9 THDS./INCH THROUGH BOTH PLATES. ENDS RIVETED OVER.
MARGINAL STAYS ONLY TO HAVE NUTS.
10
8
9
STAYS MARKED ○ 1½" DIA: SCR^D 9 THDS./INCH THRO' BOTH PLATES. ENDS RIVETED OVER. 40
MARGINAL STAYS MARKED ⊗ 1¾" DIA SCR^D 9 THDS./INCH THRO' BOTH PLATES. NUTS BOTH ENDS. 41/43
TOP CORNER STAYS MARKED ⊗ 2" DIA SCR^D 9 THDS./INCH THRO' BOTH PLATES. NUTS BOTH ENDS. 42/44
EQUAL PITCHES
1" DIA HOLES ABT 4½" PITCH.
14
25/32" THICK DOUBLER CUT FROM BACK TUBE PLATE.

### HEATING SURFACE FOR ONE BOILER.

| | |
|---|---|
| TUBES. | 1606 |
| FURNACES. (OIL FUEL.) | 202 |
| COMB. CHAMBER SIDES. | 152 |
| " " BACKS. | 75 |
| BACK TUBE PLATES. | 45 |
| TOTAL. | 2080 |

2-OFF. SEE KEY SKETCH FOR POSITION OF BUTT STRAPS ETC.

WORKING PRESS. 180 LBS/□"

TEST " 320 LBS/□"

TO LLOYDS REQUIREMENTS & INSPECTION.

5 APR 1938

### LIST OF MATERIALS & PARTS FOR ONE ENGINE Nº (I.E. 2 BOILERS.)

| DIST$^{G}$ MARK. | DESCRIPTION. | Nº OFF WORK$^{G}$ | Nº OFF SPARE | DIMENSIONS. | MAT$^{L}$ | TENSILE STRENGTH | D.O. REMARKS. | JOB Nº | SHOP NOTES. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SHELL PLATES. | 4 | - | 20'-7½" x 11'-6½" x 1 3/32" | STEEL | 28-32 | | 1 | |
| 2 | BUTT STRAPS OUTER. | 4 | - | 11'-6½" x 19¼" x 27/32" | " | " | | 1 | |
| 3 | " " INNER. | 4 | - | 10'-11" x 18⅝" x 31/32" | " | " | | 1 | |
| 4 | MANHOLE DOORS. | 4 | - | 21" x 17" x 1¼" | " | " | | 6 | |
| 5 | GIRDERS. | 40 | - | 3'-5" x 15" x 13/16" | " | " | | 2 | |
| 6 | TOP END FRONT. | 2 | - | 7'-2½"R<br>4'-10¾"<br>1⅛" THICK. | " | 26-30 | | 1 | |
| 7 | TOP END BACK. | 2 | - | 7'-3¼"R<br>4'-11½"<br>1⅛" THICK | " | " | | 1 | |
| 8 | BOTT: END FRONT. | 2 | - | 7'-3¼"R<br>10'-5⅛"<br>1" THICK. | " | " | | 1 | |
| 9 | BOTT: END BACK. | 2 | - | 27/32" THICK.<br>7'-2⅞"R<br>10'-4½" | | | | | |
| 10 | COMBUSTION CHAMBER SIDES & BOTTOM. | 4 | - | 2'-10¾" WIDE.<br>45/64" 1" 45/64"<br>11'-7½" 6" 4'-3" 6" 6'-9"<br>23'-7½" | | | | | |
| 11 | BACK TUBE PLATES. | 4 | - | 8'-7" x 6'-4½" x 25/32" | " | " | | 2 | |
| 12 | COMBUSTION CHAMBER BACK. | 4 | - | 8'-5½" x 6'-3" x 45/64" | " | " | | 2 | |
| 13 | COMPENSATING PLATE. | 2 | - | 3'-1½" x 2'-9½" x 1 1/16" | " | " | | 6 | |
| 14 | DOUBLING PLATE. | 2 | - | CUT FROM BACK TUBE PLATE. | | | | 1 | |
| 15 | RING FOR FURNACE FRONT. | 4 | - | 2" x 1" FLAT x 14'-6" EACH. | STEEL | - | | 1 | |
| 16 | FURNACE. | 4 | - | 3'-7½" INT. DIA x 7'-11¾" ORD$^{D}$ LENGTH | " | 26-30 | | 2 | |
| 17 | LIFTERS. | 8 | - | 2'-4" x 1'-2" x 7/8" | " | " | TYPE B. 53.S. | 7 | |
| 18 | PLAIN TUBES. | 396 | 24 | 2¾" EXT. DIA: x 9 L.S.G. THK. x 8'-3½" | LAP WELDED W. IRON | | | 3 | |
| 19 | STAY. " | 72 | - | " " x 3/8" " " x " | " | | NO NUTS. | 3 | |
| 20 | " " | 80 | - | " " x 5/16" " " x " | " | | " " | 3 | |
| 21 | " " | 4 | 2 | " x 3/8" " x 8'-4⅛" | " | | NUT ON FRONT END. | 3 | |
| 22 | STEAM SPACE STAYS. | 20 | - | 3" DIA: x 13'-4" | STL. | 28-32 | | 4 | |
| 23 | WATER " " | 2 | - | 3" DIA: x 13'-6" | " | " | | " | |
| 24 | BREAST " " | 4 | - | 2¼" DIA: x 8'-9" | " | " | | " | |
| 25 | OUTER NUTS FRONT FOR ㉒㉓ | 22 | - | 3⅜" HEX: x 3⅜" DEEP | W.I. | - | ORD$^{D}$ BY B.S. | " | |
| 26 | INNER " " " " | 22 | - | " " x 2¼" " | " | - | " " " | " | |
| 27 | OUTER NUTS BACK FOR ㉒㉓ | 22 | - | 3" " x 3" " | " | - | " " " | " | |
| 28 | INNER " " " " | 22 | - | " " x 2" " | " | - | " " " | " | |
| 29 | OUTER NUTS FOR ㉔ | 8 | - | 2¼" " x 2¼" | " | - | " " " | " | |
| 30 | INNER " " " | 8 | - | " " x 1¾" " | " | - | " " " | " | |
| 31 | WASHERS FOR ㉒ | 80 | - | 6½" DIA: x ¼" THK. | STEEL | - | " " " | " | |
| 32 | " " ㉓ | 8 | - | " " x " " (MIN.) | " | - | (TAPERED) " | " | |
| 33 | " " ㉔ | 16 | - | 4¾" " x " " ( " ) | " | - | " " " " | " | |
| 34 | TOP MANHOLE DOOR DOGS. | 4 | - | PATT "A" | " | - | STOCK REF 823 | 6 | |
| 35 | " " " BOLTS. | 4 | - | | " | - | DWG. 53.S | " | |
| 36 | BOTT: " " DOGS. | 4 | - | PATT "B" | " | - | STOCK REF 824 | " | |
| 37 | " " " BOLTS. | 4 | - | | " | - | DWG. 53.S | " | |
| 38 | COMB: CH. TOP STAYS. | 60 | - | ORD$^{D}$ 10 BARS 10'-0" x 1¾" HEX. | " | 26-30 | | 5 | |
| 39 | " " " " NUTS | 60 | - | 1¾" HEX. 1¾" DEEP | W.I | - | | " | |
| 40 | " " SCR$^{D}$ STAYS. | 50 | - | 1½" DIA x 10'-0" | STL. | 26-30 | | " | |
| 41 | " " " " | 15 | - | 1¾" DIA x 10'-0" | " | " | | " | |
| 42 | " " " " | ONE | - | 2" DIA: x 10'-0" | " | " | | " | |
| 43 | NUTS FOR ㊶ | 224 | - | 1¾" HEX x 7/8" THK. | W.I | - | | " | |
| 44 | " " ㊷ | 16 | - | 2" HEX: x 1" THK. | " | - | | " | |
| 45 | RIVETS. | AS REQ$^{D}$ | - | | STL. | 26-30 | | 1 | |
| | | | | | | | | | |
| | | | | | | | | | |

R. & W. HAWTHORN, LESLIE & CO. LTD.
ENGINEERS & SHIPBUILDERS
ST. PETER'S WORKS
29 MAR. 1938
NEWCASTLE-ON-TYNE

A.C.
4.4.38.

| | | | |
|---|---|---|---|
| DRAWN BY. | | DATE | |
| TRACED BY. | D. HEWARD. | | 25-3-38 |
| CHECKED BY. | | | |

## BOILER. (13'-0" INT: DIA: x 12'-3" LONG.)

SCALE:- 1" = ONE FOOT & AS MARKED.

## DRAWING Nº 10.

## ENGINE Nº 3956-7.

W1150-0155

W1150-0154

**R. & W. HAWTHORN, LESLIE**
**& CO. LTD.**

Swan Hunter & Wigham Richardson Ltd.

SHIP No. 1561-1563

RETAIN

ENGINE No. 3956-3957

Drawing No 311.1

Crankshaft.

8

1561 "TORINIA"
1563 "THIARA"

~~C[illegible] BOX No 657~~

LLOYDS REGISTER OF SHIPPING
Newcastle-on-Tyne

Altered
14 MAY 1938

W1150-0154 1/2

ENCLOSURE TO

Lloyds Register of Shipping

Newcastle

5,000 486 11/36

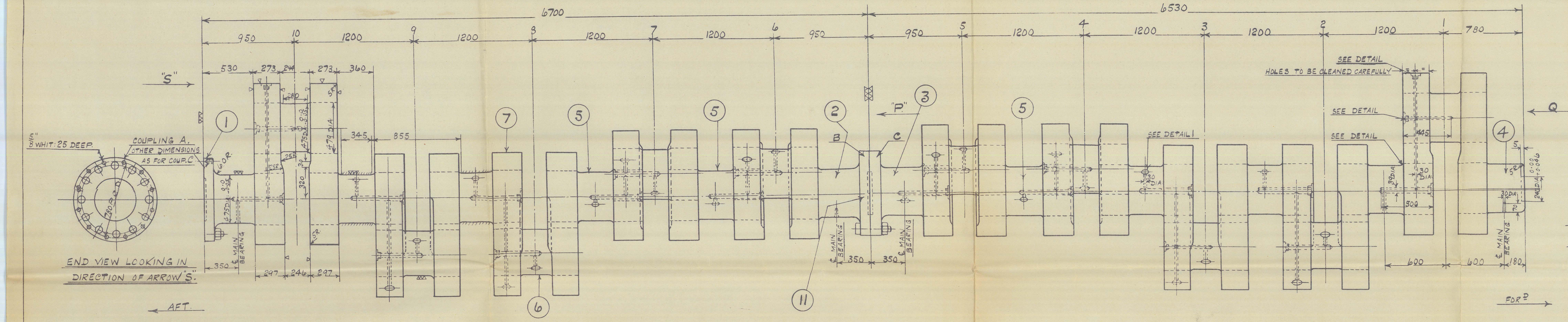
**From R. & W. HAWTHORN, LESLIE & Co., Ltd.,**

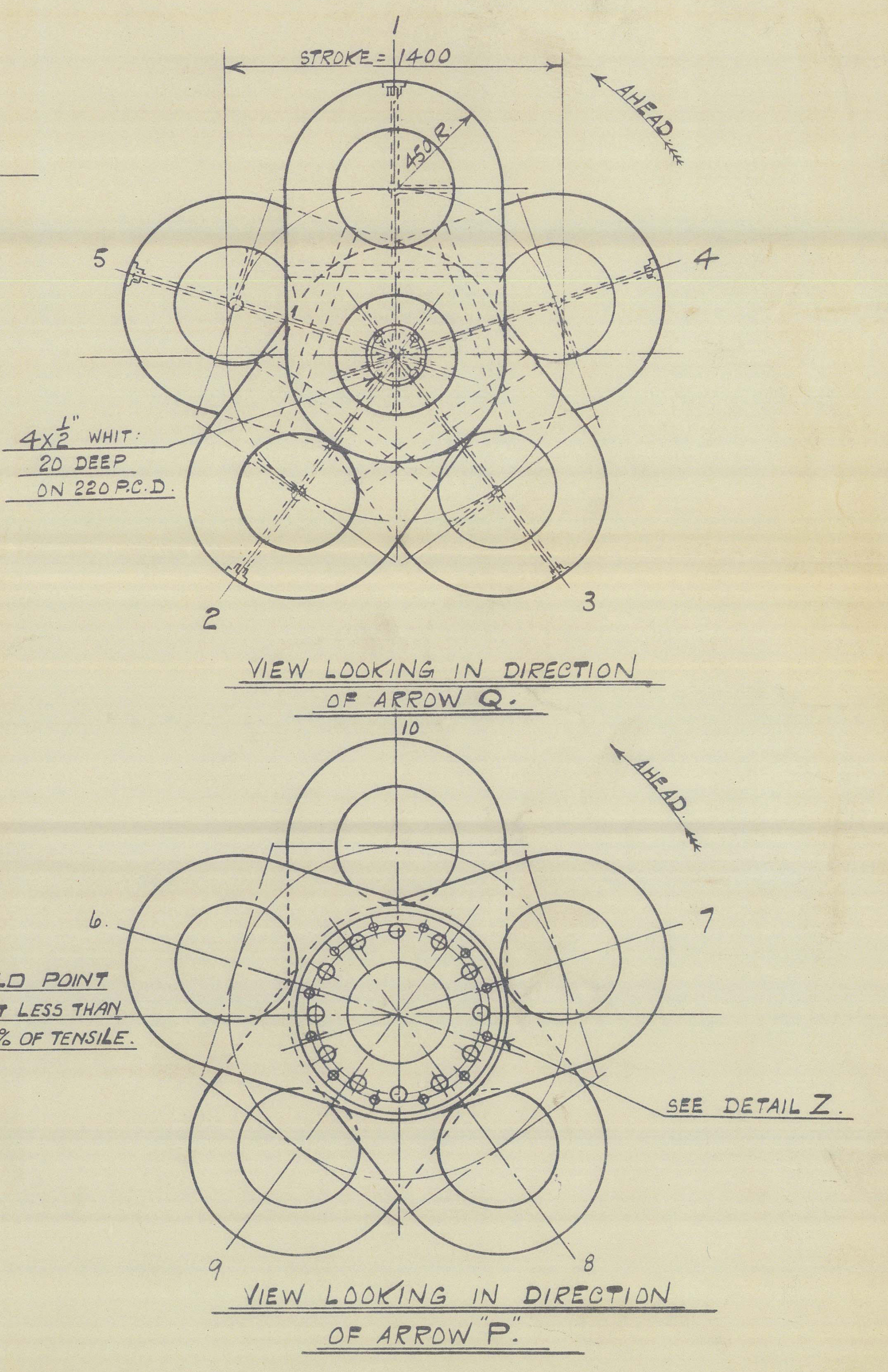
ST. PETER'S WORKS, NEWCASTLE-ON-TYNE.

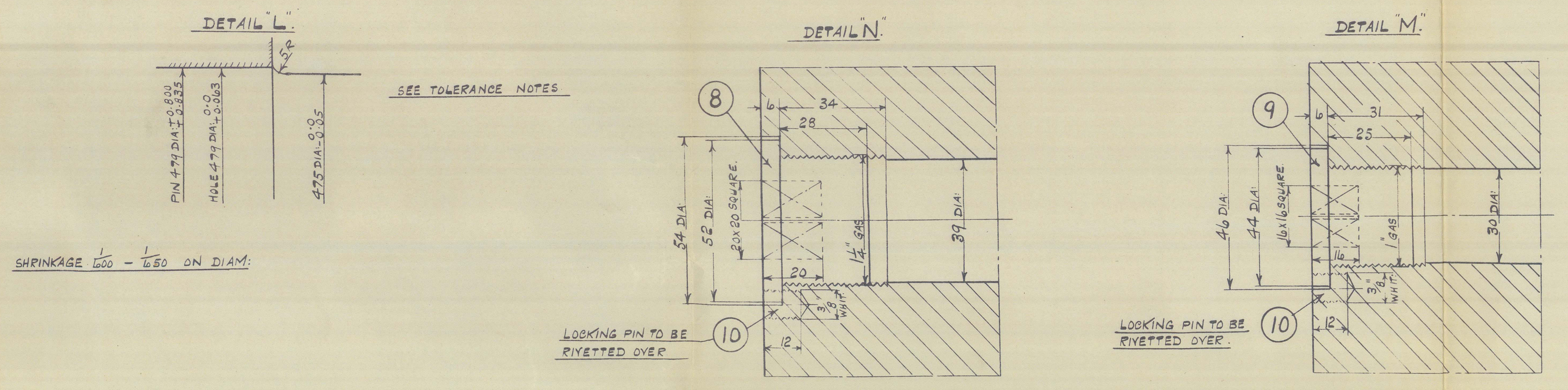
Prints in triplicate and Data sheet.

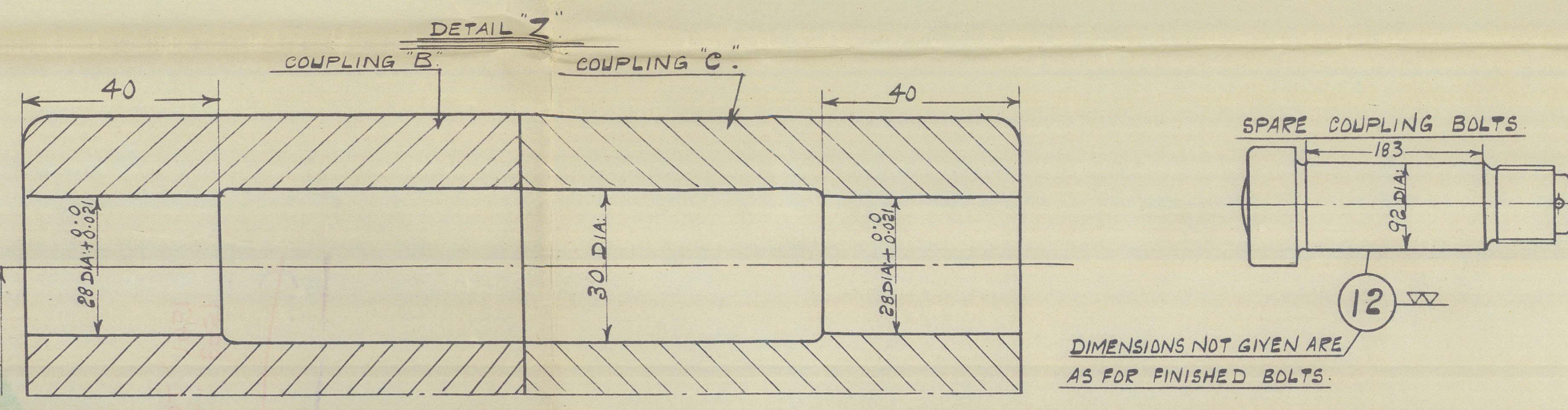
NKSHAFT.

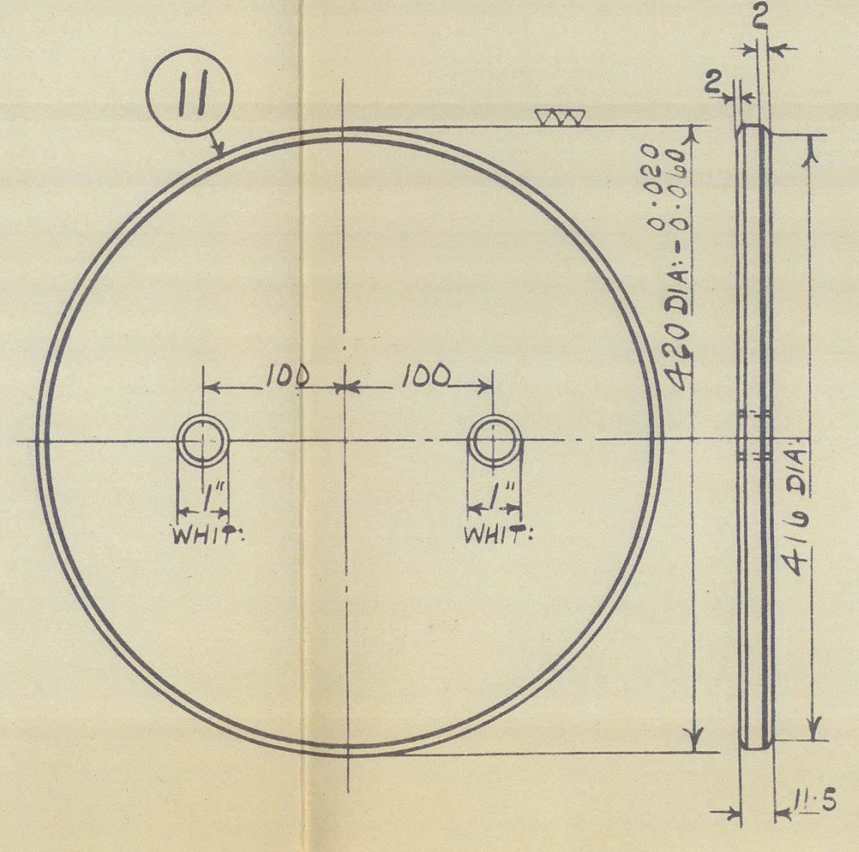
| ORDER OF FIRING - AHEAD | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7 | 3 | 9 | 5 | 10 | 4 | 8 | 2 | 6 |

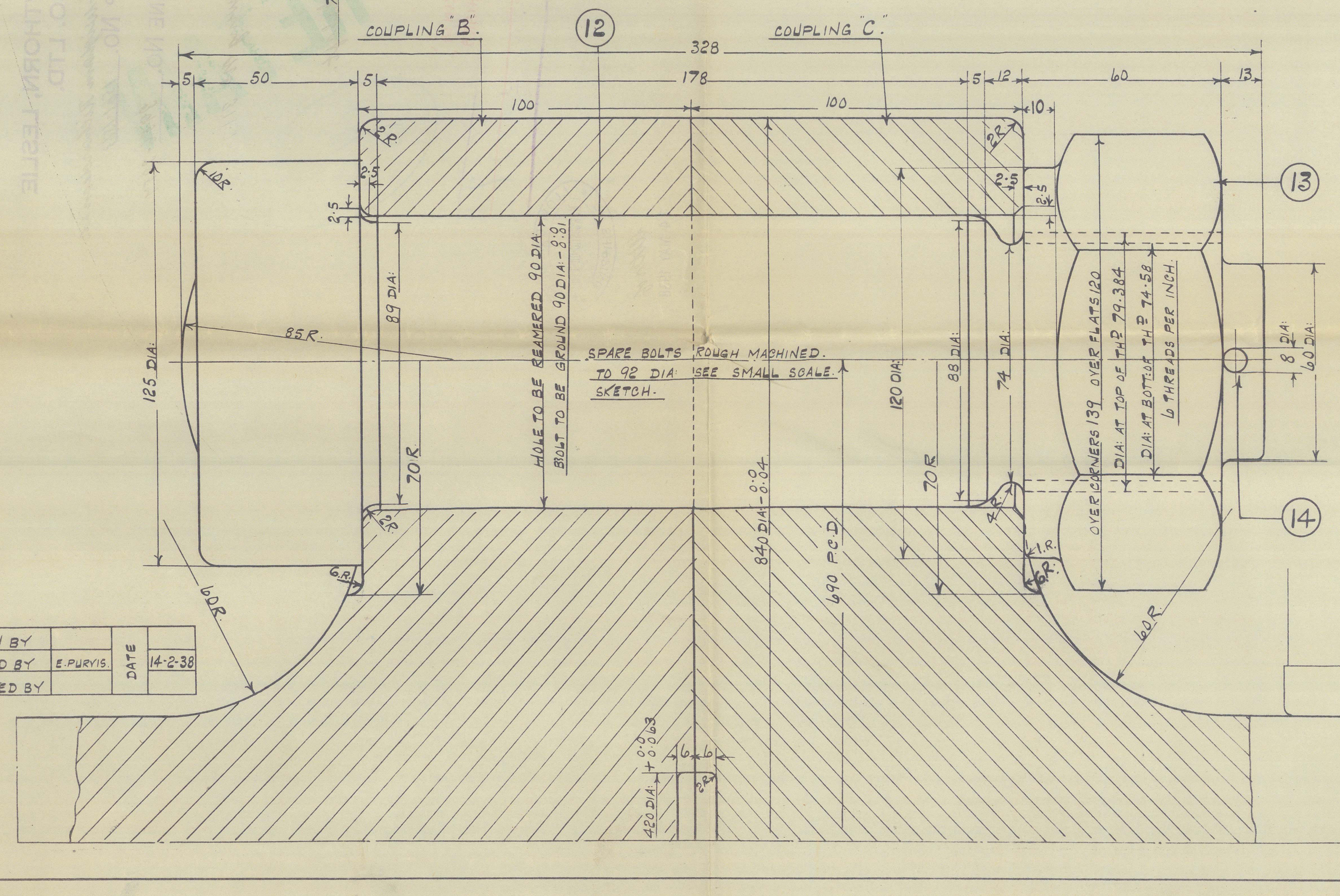

6700
6530
950
10
1200
9
8
7
6
5
4
3
2
1
780
530
273
360
345
855
"S"
"P"
Q
COUPLING A. OTHER DIMENSIONS AS FOR COUP. C
$\frac{7}{8}$" WHIT: 25 DEEP.
END VIEW LOOKING IN DIRECTION OF ARROW 'S'.
AFT
FOR$^{D}$
SEE DETAIL
HOLES TO BE CLEANED CAREFULLY
℄ MAIN BEARING
350
600
180
B
C
①
②
③
④
⑤
⑥
⑦
⑪


STROKE = 1400
AHEAD
4 x $\frac{1}{2}$" WHIT 20 DEEP ON 220 P.C.D.
VIEW LOOKING IN DIRECTION OF ARROW Q.
SEE DETAIL Z.
VIEW LOOKING IN DIRECTION OF ARROW P.
1
2
3
4
5
6
7
8
9

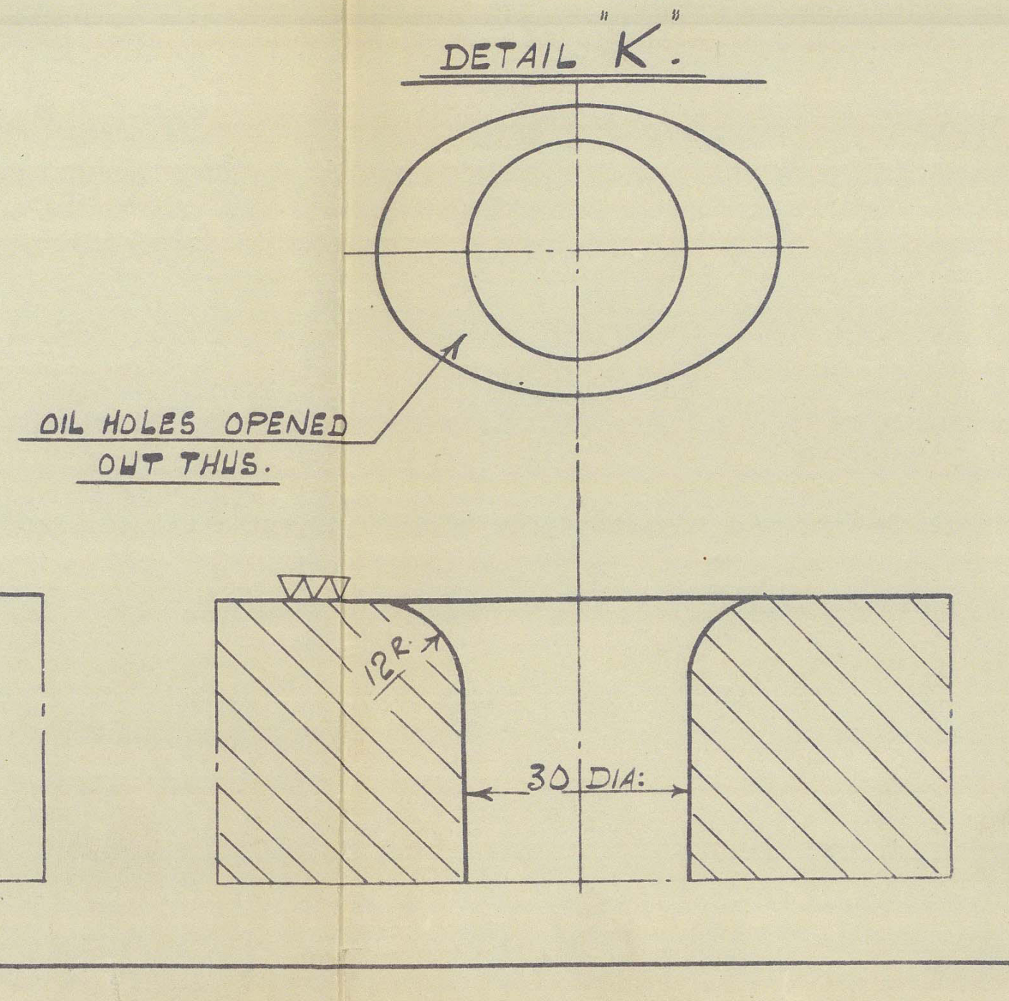








| DRAWN BY | | DATE | |
|---|---|---|---|
| TRACED BY | E. PURVIS. | | 14-2-38 |
| CHECKED BY | | | |



NOTE:-

CRANKSHAFT TO BE FINISHED MACHINED ALL OVER. TO BE TO LLOYDS SURVEY REQUIREMENTS & INSPECTION & TO R & W. HAWTHORN LESLIE & C$^{os}$ SATISFACTION LLOYDS CERTIFICATE TO BE FORWARDED TO R & W. H. L. & C$^{o}$

DIMENSIONS ARE IN MILLIMETRES EXCEPT WHERE OTHERWISE STATED ALL PARTS TO BE FORGED FROM THE BEST SIEMEN'S MARTIN INGOT STEEL FORGINGS TO BE ANNEALED & TO HAVE THE FOLLOWING QUALITIES:- ULTIMATE TENSILE STRENGTH 28-32 TONS/□" WITH AN ELONGATION OF NOT LESS THAN 29% TO 25% ON STANDARD TEST PIECE; BENDING TEST ANGLE 180° } YIELD POINT NOT LESS THAN 50% OF TENSILE. WHEN HEATING THE WEBS FOR SHRINKING THEY SHOULD BE RAISED TO A UNIFORM TEMPERATURE WHICH SHOULD NOT AT ANY TIME EXCEED 375°C. EACH WEB TO BE HEATED ONCE ONLY & PINS & JOURNALS TO BE ENTERED SIMULTANEOUSLY. FINISHED CRANKSHAFT TO BE EXAMINED BY OWNERS REPRESENTATIVE & MUST PROVE TO BE FREE FROM ALL FLAWS & OTHER DEFECTS.

TOLERANCE NOTES

OVAL TOLERANCE FOR PINS & JOURNALS 0.025 m/m.

OUT OF LINE TOLERANCE FOR PINS & JOURNALS NOT TO EXCEED 0.15 m/m IN 1 METRE.

MAXIMUM VARIATION OF THE JOURNALS WHEN TURNED AROUND 0.03 m.m.

MAXIMUM VARIATION OF THE DISTANCE OF CENTRES OF THE CRANKPINS 0.2 m.m.

MAXIMUM VARIATION OF THE DISTANCE OF CRANK 1 TO CRANK 5 = 1 m.m.

ANGLE OF CRANKS TO BE $72^{\circ}\,^{+5'}_{-5'}$

| | |
|---|---|
| FOUR STROKE. SINGLE ACTING | |
| 10 CYL. SUPER CHARGED DIESEL-ENGINE | |
| BORE OF CYL: | 650 |
| STROKE | 1400 |
| NUMBER OF REV: PER MIN. | 120 |
| MAX: PRESSURE PER SQ IN. | 700 LB.S |
| M.I.P. 135 LBS PER SQ IN. | 4660 B.H.P. |

## LIST OF PARTS.

QUANTITIES GIVEN ARE FOR ONE ENGINE Nº ONLY.

| DIST: MARK | DESCRIPTION | Nº OFF WORKING AS DRN: | Nº OFF WORKING OPP: HND: | Nº OFF SPARE | MATERIAL | MAKERS | D.O. REMARKS | COST INDEX 311 JOB Nº | SHOP NOTES. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AFT JOURNAL AFT SHAFT. | ONE | | | STEEL | ORDERED OUTSIDE FINISHED | | 7 | |
| 2 | FORD. JOURNAL AFT SHAFT | ONE | | | " | | | 7 | |
| 3 | AFT JOURNAL FOR$^{D}$ SHAFT | ONE | | | " | | | 7 | |
| 4 | FOR$^{D}$ JOURNAL FOR$^{D}$ SHAFT | ONE | | | " | | | 7 | |
| 5 | JOURNALS - PLAIN | 8 | | | " | | | 7 | |
| 6 | CRANKPINS | 10 | | | " | | | 7 | |
| 7 | CRANK WEBS | 20 | | | " | | | 7 | |
| 8 | PLUG 1$\frac{1}{4}$" GAS | 20 | | | R.N.B. | | | 7 | |
| 9 | PLUG 1" GAS | 10 | | | " | | | 7 | |
| 10 | LOCKING PINS | 30 | | | STEEL | | | 7 | |
| 11 | SPIGOT PLATE | ONE | | | " | | | 7 | |
| 12 | COUPLING BOLTS | 12 | | 12 | 3% NICKEL STEEL | | 38-45 TONS TENS.<br>19% ELONG. | 5 | |
| 13 | NUTS | 12 | | 12 | STEEL | | 32-38 TONS TENS.<br>25% ELONG. | 5 | |
| 14 | SPLIT PINS | 12 | | | " | | | 5 | |
| 15 | | | | | | | | | |

# CRANKSHAFT.

SCALES:- FULL SIZE, 1/20, 2/5.

R. & W. HAWTHORN, LESLIE & CO. LTD
ENGINEERS & SHIPBUILDERS
ST. PETER'S WORKS
12 MAY 1938
NEWCASTLE-ON-TYNE

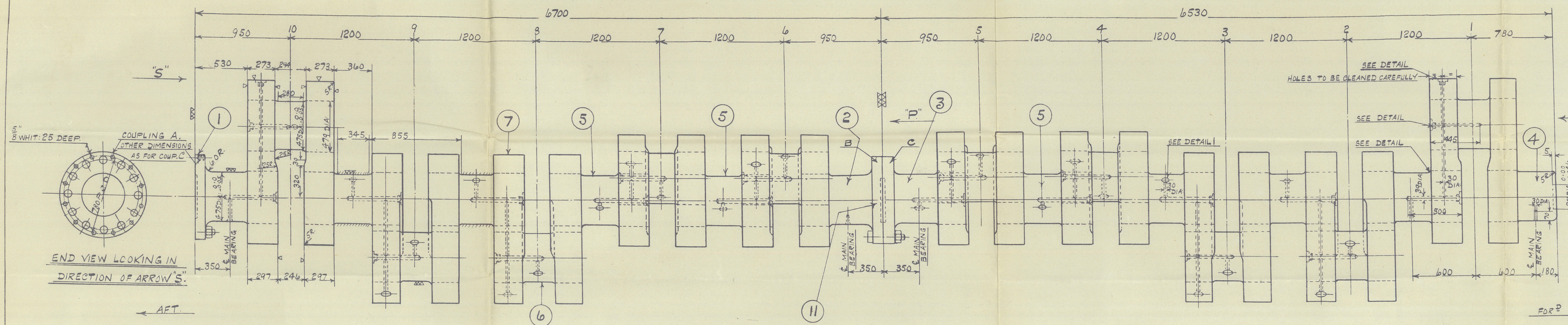
DRAWING Nº 311·1

ENGINE Nº 3956 - 7

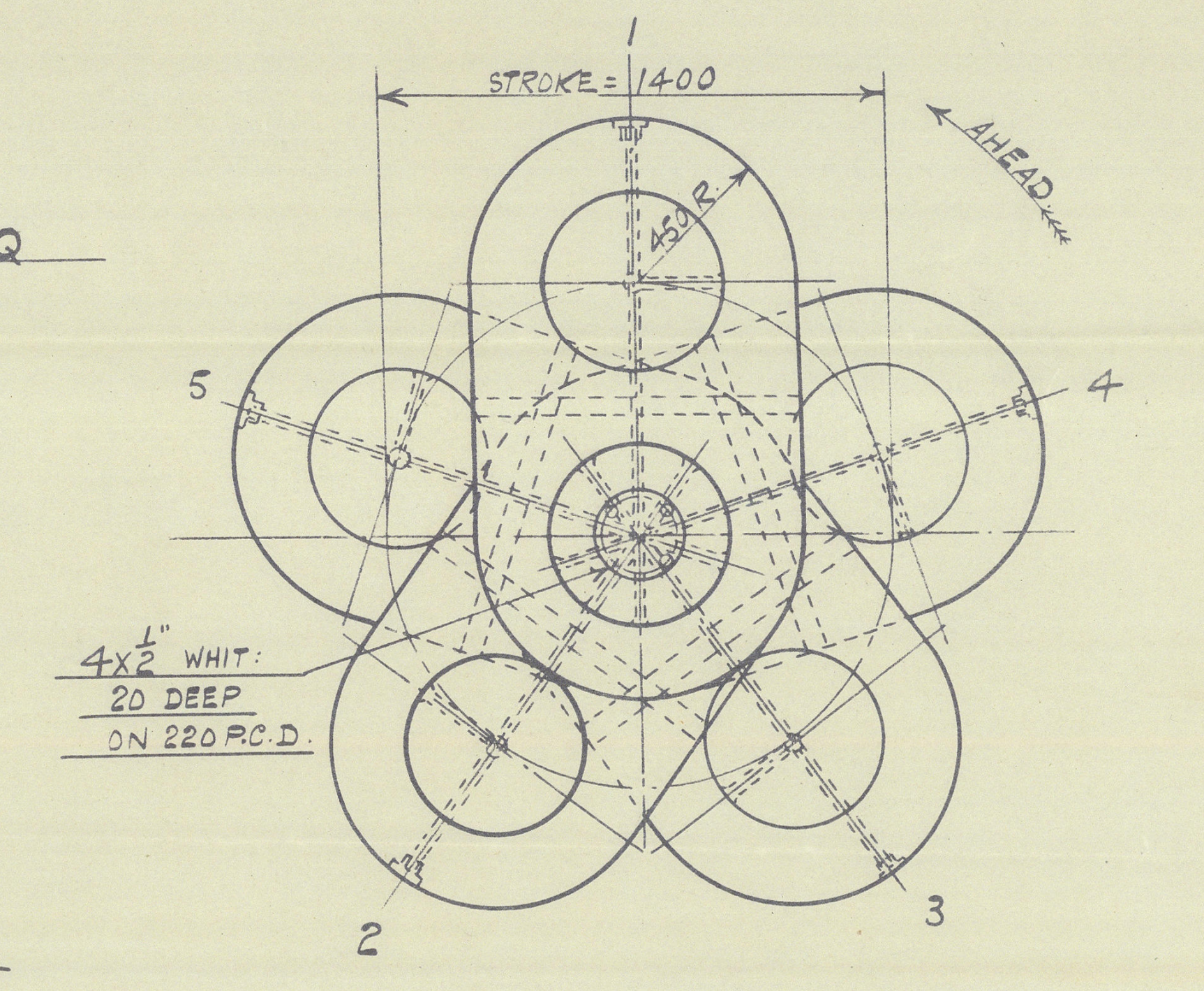
W1150-0154 2/2

24 MAY 1938

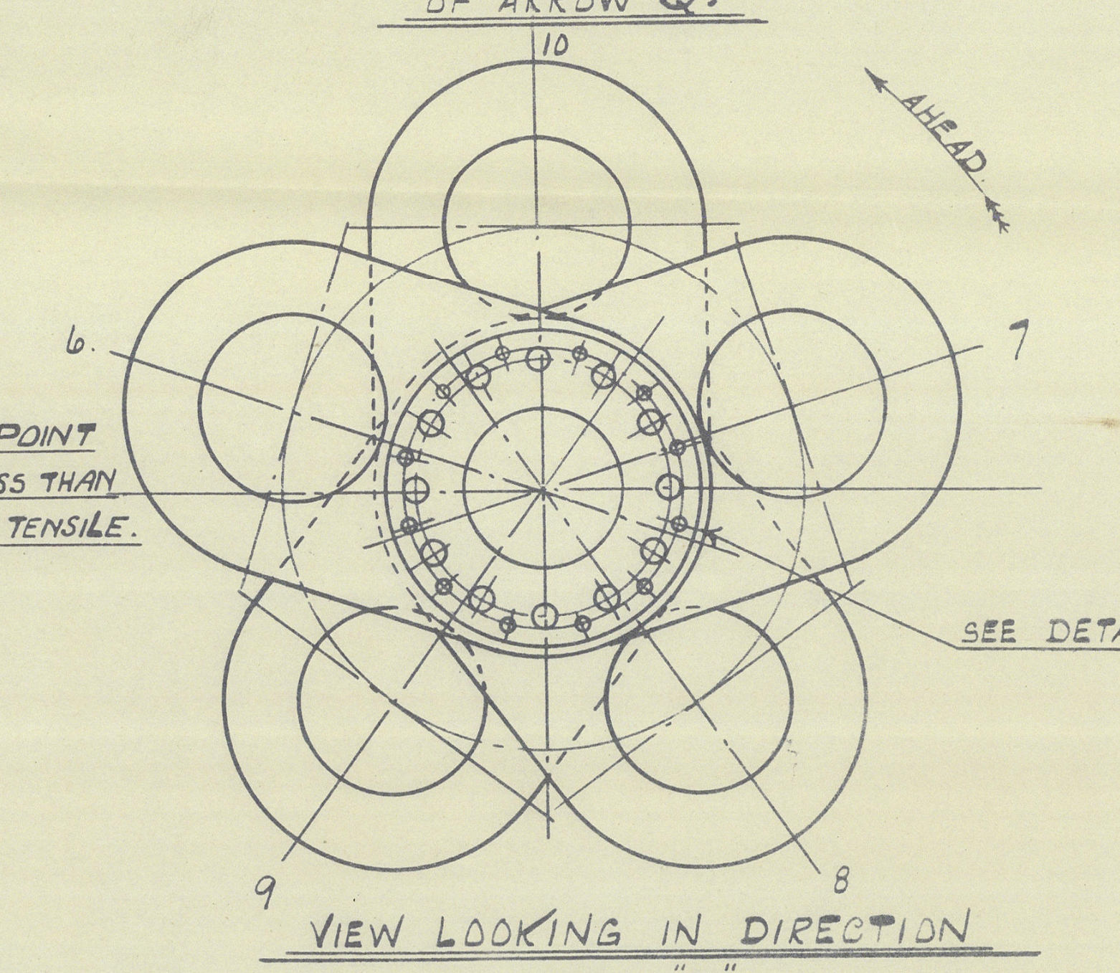
| ORDER OF FIRING - AHEAD | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7 | 3 | 9 | 5 | 10 | 4 | 8 | 2 | 6 |



END VIEW LOOKING IN DIRECTION OF ARROW "S".

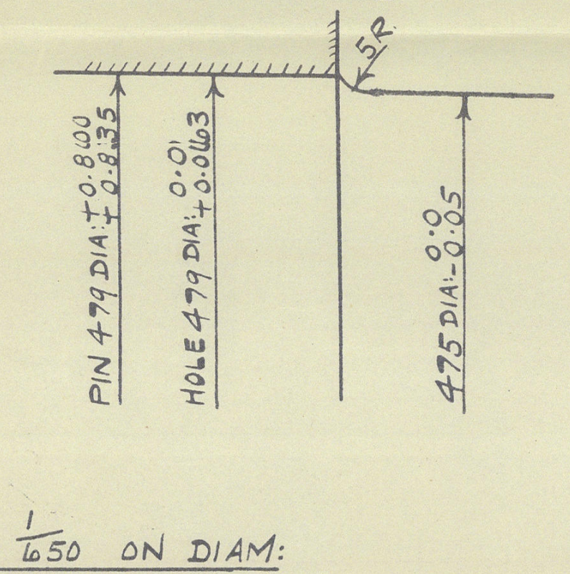


VIEW LOOKING IN DIRECTION OF ARROW Q.



VIEW LOOKING IN DIRECTION OF ARROW "P".

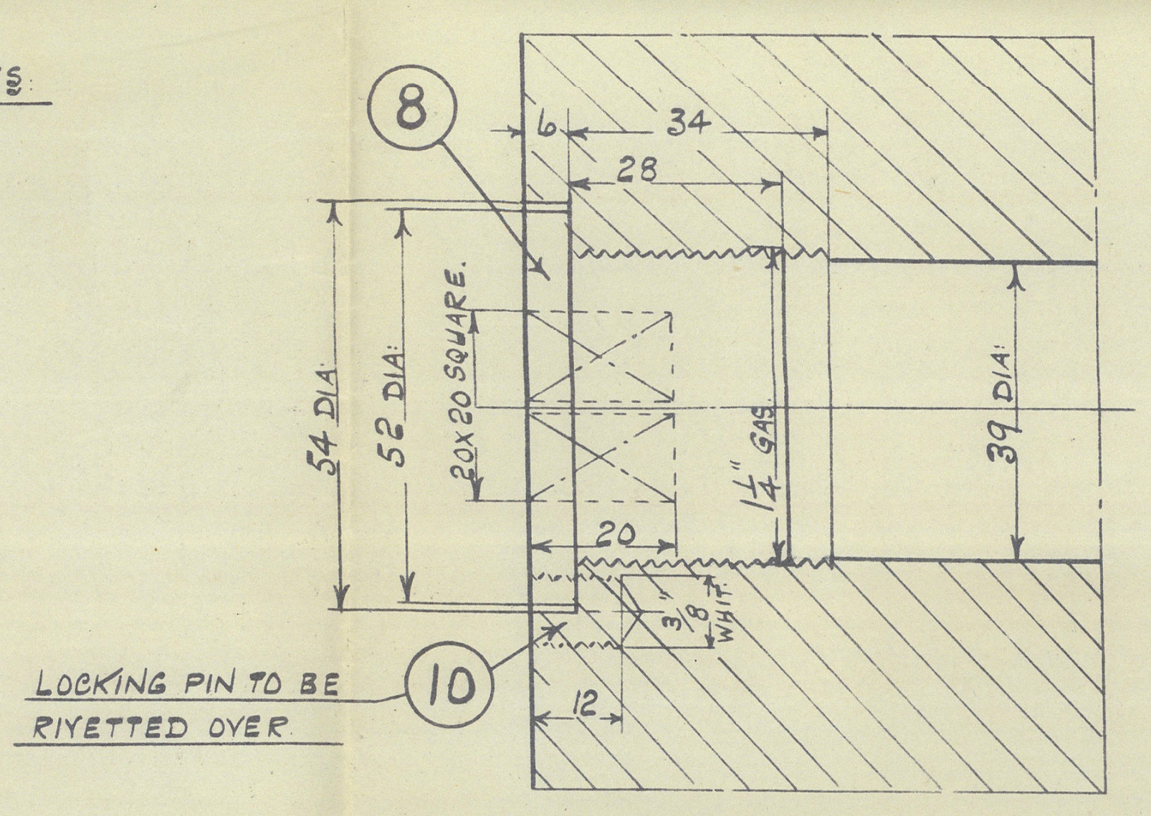
DETAIL "L".



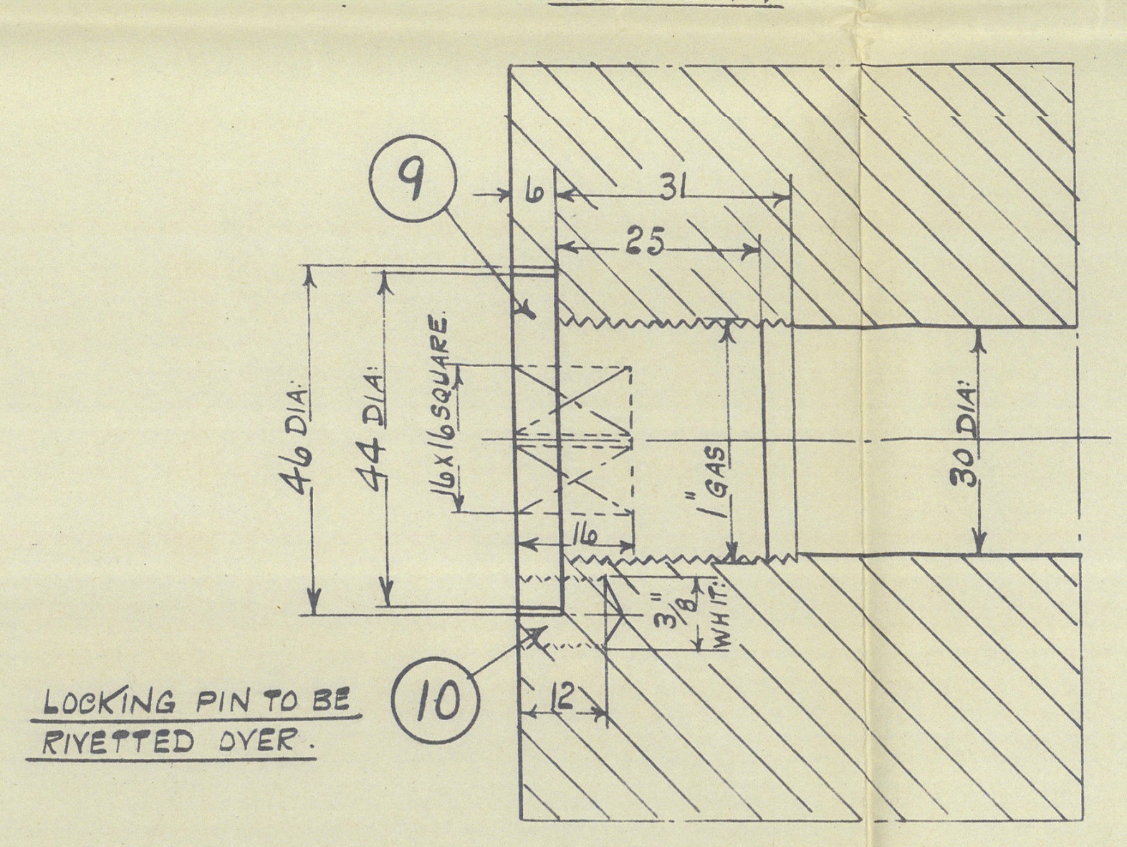
SEE TOLERANCE NOTES

SHRINKAGE 1/1600 - 1/1650 ON DIAM:

DETAIL "N".



DETAIL "M".



NOTE:-

CRANKSHAFT TO BE FINISHED MACHINED ALL OVER. TO BE TO LLOYDS SURVEY REQUIREMENTS & INSPECTION & TO R&W. HAWTHORN LESLIE & C^OS SATISFACTION LLOYDS CERTIFICATE TO BE FORWARDED TO R&W.H.L.& C^O

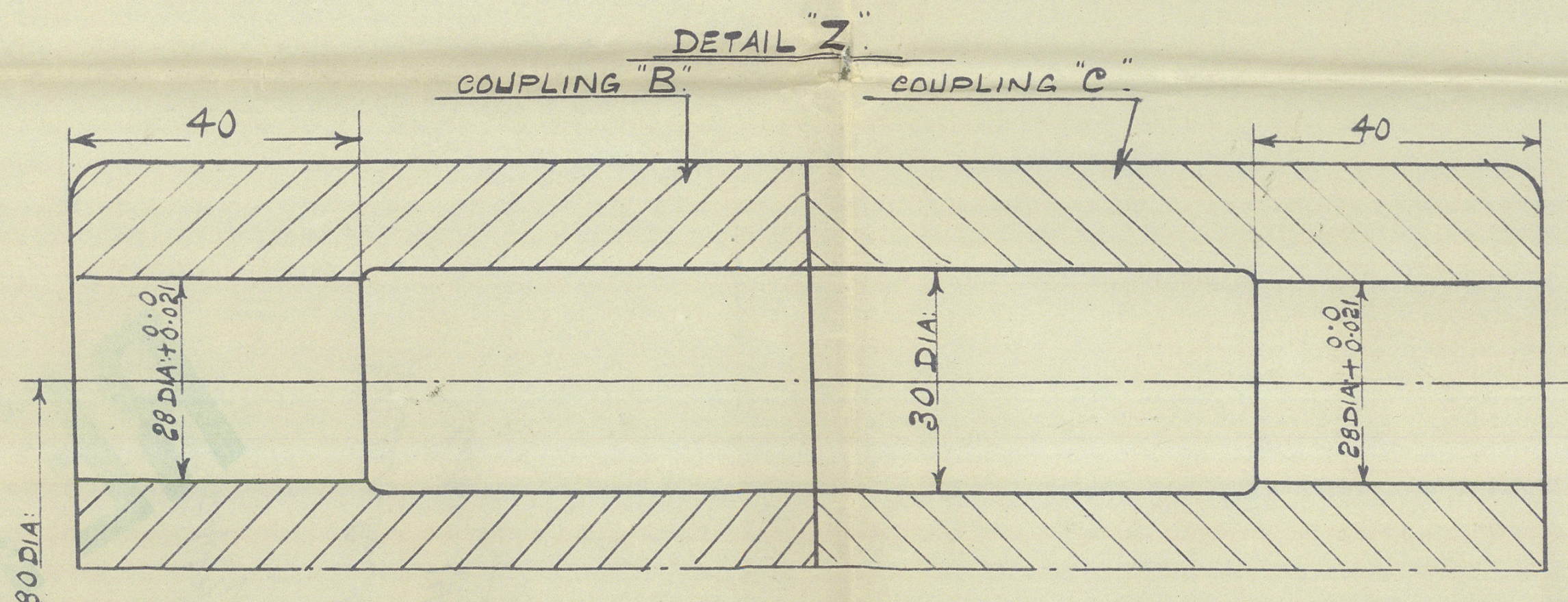
DIMENSIONS ARE IN MILLIMETRES EXCEPT WHERE OTHERWISE STATED

ALL PARTS TO BE FORGED FROM THE BEST SIEMEN'S MARTIN INGOT STEEL FORGINGS TO BE ANNEALED & TO HAVE THE FOLLOWING QUALITIES:- ULTIMATE TENSILE STRENGTH 28 - 32 TONS/□" WITH AN ELONGATION OF NOT LESS THAN 29% TO 25% ON STANDARD TEST PIECE; BENDING TEST ANGLE 180°

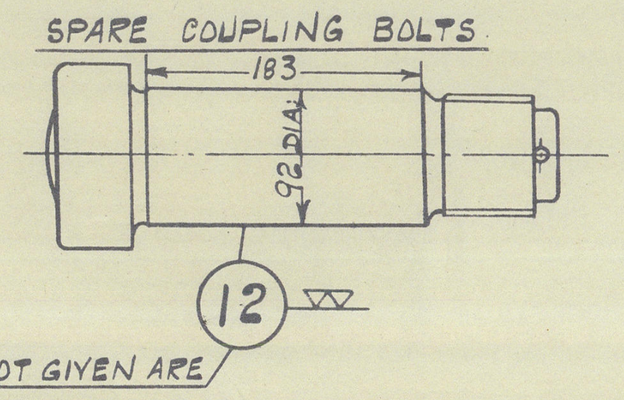
YIELD POINT NOT LESS THAN 50% OF TENSILE.

WHEN HEATING THE WEBS FOR SHRINKING THEY SHOULD BE RAISED TO A UNIFORM TEMPERATURE WHICH SHOULD NOT AT ANY TIME EXCEED 375°C. EACH WEB TO BE HEATED ONCE ONLY & PINS & JOURNALS TO BE ENTERED SIMULTANEOUSLY. FINISHED CRANKSHAFT TO BE EXAMINED BY OWNERS REPRESENTATIVE & MUST PROVE TO BE FREE FROM ALL FLAWS & OTHER DEFECTS.

DETAIL "Z".



SPARE COUPLING BOLTS



DIMENSIONS NOT GIVEN ARE AS FOR FINISHED BOLTS

TOLERANCE NOTES

OVAL TOLERANCE FOR PINS & JOURNALS 0·025 m/m.

OUT OF LINE TOLERANCE FOR PINS & JOURNALS NOT TO EXCEED 0·15 m/m IN 1 METRE

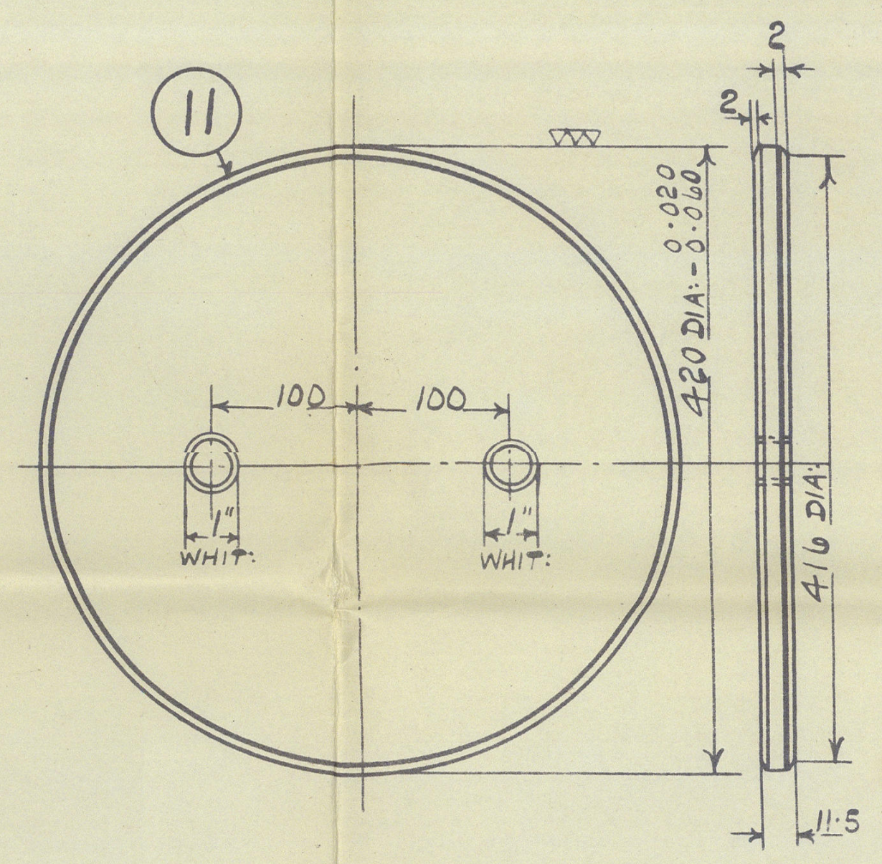
MAXIMUM VARIATION OF THE JOURNALS WHEN TURNED AROUND 0·03 m.m.

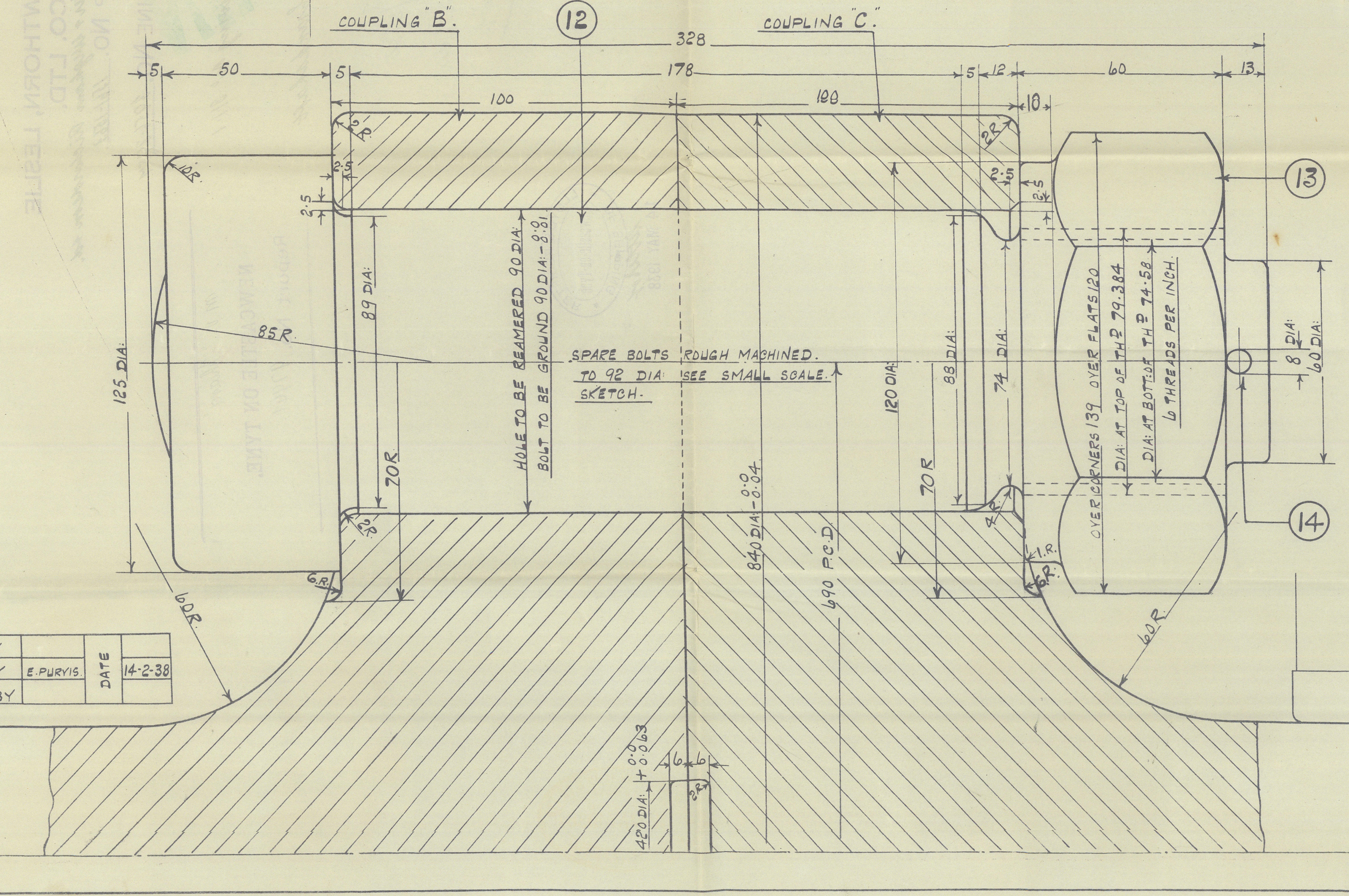
MAXIMUM VARIATION OF THE DISTANCE OF CENTRES OF THE CRANKPINS 0·2 m.m.

MAXIMUM VARIATION OF THE DISTANCE OF CRANK 1 TO CRANK 5 = 1 m.m.

ANGLE OF CRANKS TO BE $72^{\circ}\,{}^{+5'}_{-5'}$

| | |
|---|---|
| FOUR STROKE. SINGLE ACTING | |
| 10 CYL. SUPER CHARGED DIESEL-ENGINE | |
| BORE OF CYL: 650 | |
| STROKE 1400 | |
| NUMBER OF REV: PER MIN. 120 | |
| MAX: PRESSURE PER SQ IN. 700 LBS. | |
| M.I.P. 135 LBS PER SQ IN. 4660 B.H.P. | |




COUPLING "B".
COUPLING "C".
⑫
⑬
⑭
328
5
50
178
12
60
13
100
100
10
2R
2.5
10R
85R
125 DIA.
89 DIA.
70R
HOLE TO BE REAMERED 90 DIA.
BOLT TO BE GROUND 90 DIA: - 0.0 / - 0.01
SPARE BOLTS ROUGH MACHINED. TO 92 DIA: SEE SMALL SCALE. SKETCH.
840 DIA - 0.0 / - 0.04
690 P.C.D.
120 DIA.
88 DIA.
74 DIA.
OVER CORNERS 139 OVER FLATS 120
DIA: AT TOP OF TH^D 79.384
DIA: AT BOTT: OF TH^D 74.58
6 THREADS PER INCH.
8 DIA.
60 DIA.
1.R.
6R.
6.R.
60R.
420 DIA + 0.0 / + 0.063

| | | | |
|---|---|---|---|
| DRAWN BY | | DATE | |
| TRACED BY | E. PURVIS. | | 14-2-38 |
| CHECKED BY | | | |

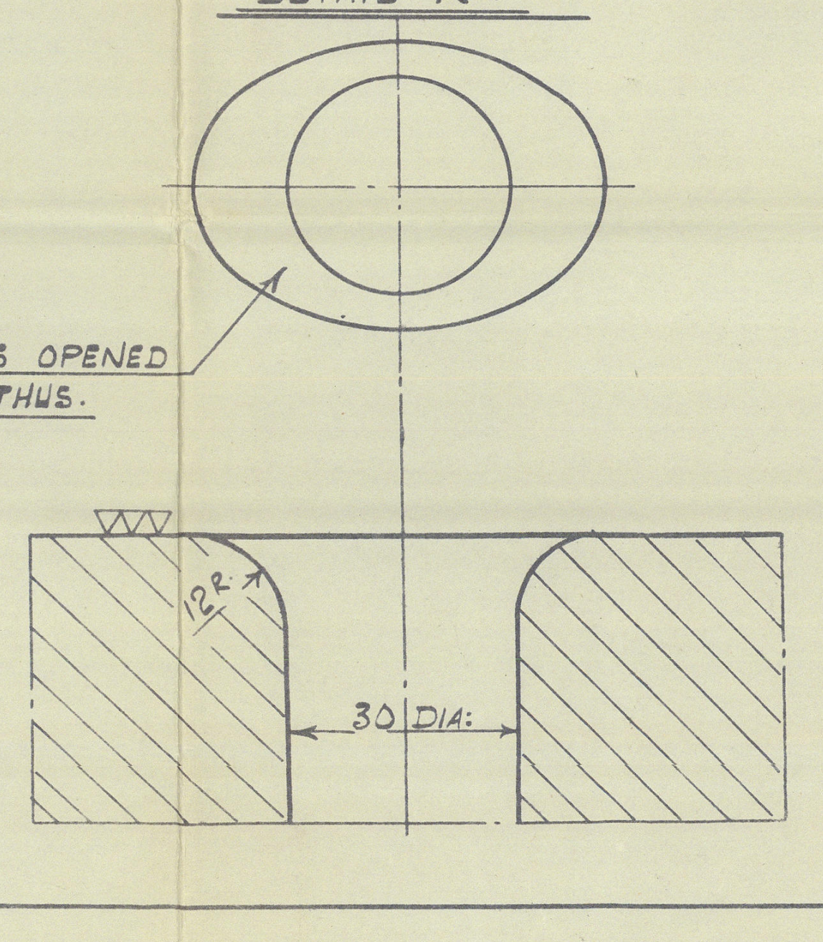
LIST OF PARTS.

QUANTITIES GIVEN ARE FOR ONE ENGINE Nº ONLY.

| DIST: MARK | DESCRIPTION | Nº OFF WORKING AS DRN: | Nº OFF WORKING OPP: HND: | Nº OFF SPARE | MATERIAL | MAKERS | D.O. REMARKS | COST INDEX 311 JOB Nº | SHOP NOTES. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | AFT JOURNAL AFT SHAFT. | ONE | | | STEEL | ORDERED OUTSIDE FINISHED | | 7 | |
| 2 | FORD. JOURNAL AFT SHAFT | ONE | | | " | | | 7 | |
| 3 | AFT JOURNAL FOR^D SHAFT | ONE | | | " | | | 7 | |
| 4 | FOR^D JOURNAL FOR^D SHAFT | ONE | | | " | | | 7 | |
| 5 | JOURNALS - PLAIN | 8 | | | " | | | 7 | |
| 6 | CRANK PINS | 10 | | | " | | | 7 | |
| 7 | CRANK WEBS | 20 | | | " | | | 7 | |
| 8 | PLUG 1 1/4" GAS | 20 | | | R.N.B. | | | 7 | |
| 9 | PLUG 1" GAS | 10 | | | " | | | 7 | |
| 10 | LOCKING PINS | 30 | | | STEEL | | | 7 | |
| 11 | SPIGOT PLATE | ONE | | | " | | | 7 | |
| 12 | COUPLING BOLTS | 12 | | 12 | 3% NICKEL STEEL | | 38-45 TONS TENS. 19% ELONG. | 5 | |
| 13 | NUTS | 12 | | 12 | STEEL | | 32-38 TONS TENS. 25% ELONG. | 5 | |
| 14 | SPLIT PINS | 12 | | | " | | | 5 | |
| 15 | | | | | | | | | |

T.R.M.
23-5-38.

DETAIL "K".



CRANKSHAFT.

SCALES:- FULL SIZE, 1/20, 2/5.

R. & W. HAWTHORN, LESLIE & CO. LTD.
ENGINEERS & SHIPBUILDERS
ST. PETER'S WORKS
12 MAY 1938
NEWCASTLE-ON-TYNE

DRAWING Nº 311·1

ENGINE Nº 3956-7

W1150-0156

Noted 9/5/38

ARRANGEMENT OF SHAFTING

SCALE 1/2" = ONE FOOT

DRAWING No 186

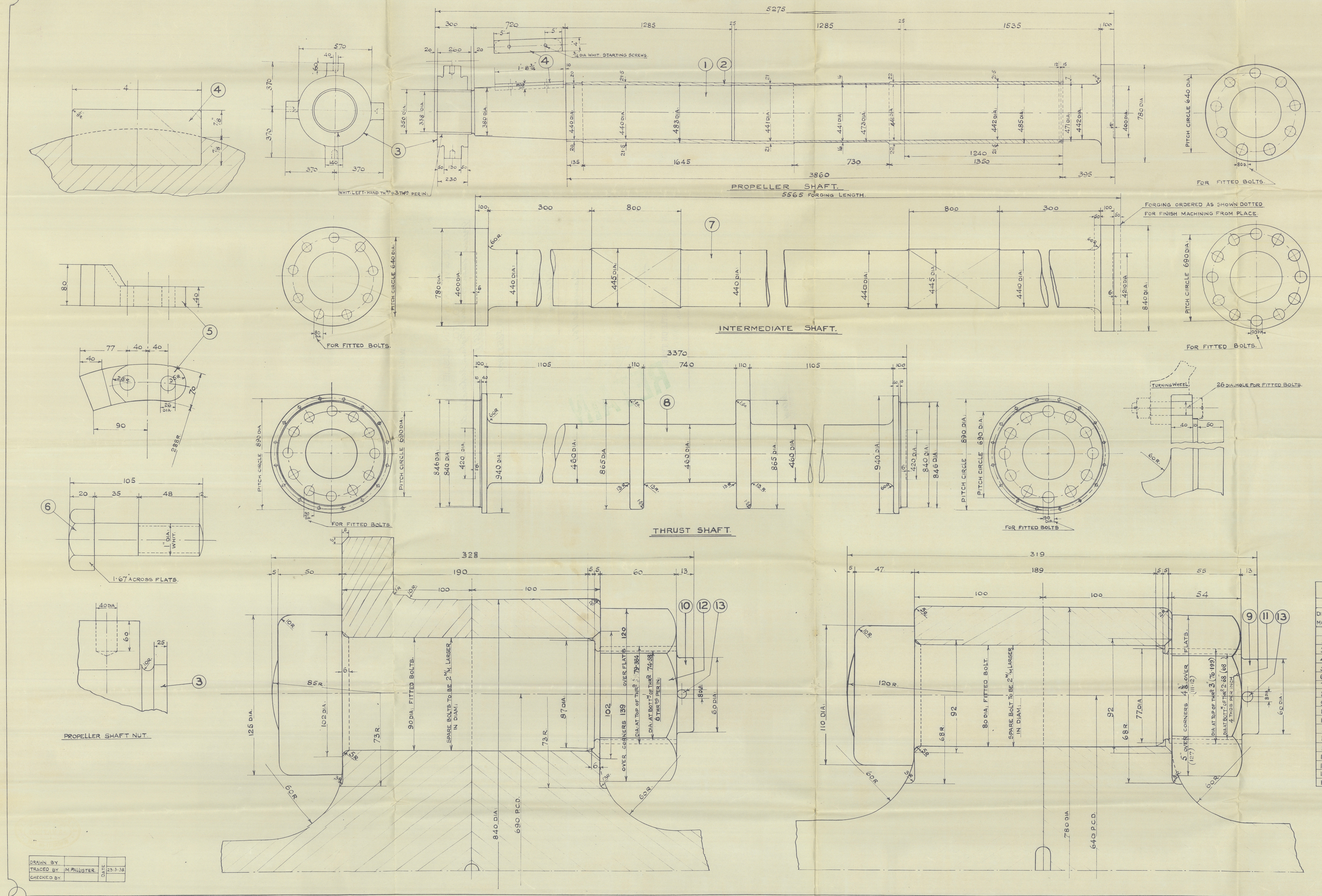
ENGINE Nos 3956-7

R. & W. HAWTHORN, LESLIE & CO. LTD.
ENGINEERS & SHIPBUILDERS
ST. PETERS WORKS
- 3 MAY 1938
NEWCASTLE-ON-TYNE

10 MAY 1938

W1150-015 2

10 MAY 1938



| DRAWN BY. | | DATE. | |
|---|---|---|---|
| TRACED BY. | M. PALLISTER. | | 23:3:38. |
| CHECKED BY. | | | |

| DIESEL ENGINE SUPER-CHARGED. | |
|---|---|
| FOUR CYCLE - SINGLE ACTING. | |
| BORE OF CYLINDER. | 650 M/M |
| STROKE | 1400 M/M |
| NUMBER OF REVS. PER MINUTE. | 120 |
| MAXIMUM PRESSURE. | 700 LBS |
| M.I.P. | 135 LBS. |
| B.H.P. | 4660 |
| DIAMETER OF CRANKSHAFT | 475 M/M. |
| " " PROPELLER. | 4953 M/M. |

FOR ARRANGEMENT OF SHAFTING SEE DRG: 186.
" DETAILS OF STERN TUBE. " " 187.
" " " CRANKSHAFT. " " 311.
" " " PROPELLER. " " 182.
" " " TURNING GEAR WHEEL " " 341. SHT 6.

DIMENSIONS GIVEN ARE IN MILLIMETRES EXCEPT WHERE OTHERWISE STATED.

TO BE TO LLOYDS SURVEY.

MATERIAL SPECIFICATION.

SHAFTS:- PRESSED FORGED STEEL 28-32 TONS. TENSILE 25-29% ELONGATION.
COUPLING BOLTS:- 3% NICKEL STEEL ABOUT 40 TONS TENSILE. 19% ELONGATION.
NUTS:- STEEL 32 TO 38 TENSILE 25% "
LINER:- GUNMETAL. 88% COPPER, 10% TIN, 2% ZINC.

HBL 9/5/38

## LIST OF PARTS.

QUANTITIES GIVEN ARE FOR ONE ENGINE No ONLY.

| DIST: MARK: | DESCRIPTION. | No OFF. WORKING | | | MATERIAL | MAKERS. | D.O. REMARKS. | COST INDEX 186. | SHOP NOTES. |
|---|---|---|---|---|---|---|---|---|---|
| | | AS DRN. | OPP. HND. | SPARE | | | | JOB No | |
| 1. | PROPELLER SHAFT. | ONE | | ONE | FORGED STEEL | MATERIAL O.O. | | 2 | |
| 2 | " " LINER. | ONE | | ONE | GUNMETAL | R & W. H. L | | 3 | |
| 3 | " " NUT | ONE | | ONE | WROT IRON. | MATERIAL O.O. | | 2 | |
| 4 | " " KEY. | ONE | | ONE | STEEL | R & W. H. L | | 2 | |
| 5 | STOPPER FOR NUT | ONE | | | " | " | | 2 | |
| 6 | BOLTS FOR STOPPER. | 2 | | | " | " | | 2 | |
| 7 | INTERMEDIATE SHAFT | ONE | | | FORGED STEEL | MATERIAL O.O. | | 4 | |
| 8 | THRUST SHAFT | ONE | | | " | " | | 5 | |
| 9 | COUPLING BOLTS. | 9 | | 9 | NICKEL STEEL | MATERIAL O.O. | | 6 | |
| 10 | COUPLING BOLTS. | 24 | | | " | " | | 6 | |
| 11 | NUTS FOR ⑨ | 9 | | 9 | STEEL | MATERIAL O.O. | | 6 | |
| 12 | NUTS FOR ⑩ | 24 | | | " | " | | 6 | |
| 13 | SPLIT PINS FOR ⑨ & ⑩ | 33 | | 9 | " | R & W. H. L. | | 6 | |
| 14 | | | | | | | | | |
| 15 | | | | | | | | | |
| 16 | | | | | | | | | |
| 17 | | | | | | | | | |
| 18 | | | | | | | | | |

# SHAFTING.

SCALES:- FULL SIZE, 1/10 & 2/5.

R. & W. HAWTHORN, LESLIE & CO. LTD.
ENGINEERS & SHIPBUILDERS
ST. PETER'S WORKS
-3 MAY 1938
NEWCASTLE-ON-TYNE

27 APR 1938

## DRAWING No 186·1.

## ENGINE No 3956-7.

W1150-0153

Rules for application of E.A.W. to be complied with.
Notation to be made in the Register Book "Rudder Electrically Welded".

Upper web.
Webs to be respaced to suit as shown.

upper web.
Webs to be respaced to suit as shown

Diese Zeichnung darf ohne unsere Genehmigung weder dritten Personen noch Konkurenzfirmen mitgeteilt werden. (§§ 1 u. 2 des Gesetzes v. 19. Juni 1901)
Deutsche Werft Aktiengesellschaft Hamburg.

4065
200
4265
6 | 710

## DIMENSIONS.

| | | |
|---|---|---|
| LENGTH | 500'-0" | 152,397 m |
| BREADTH | 64'-6" | 19,659 " |
| DEPTH | 37'-0" | 11,277 " |
| DRAFT | 29'-3" | 8,915 " |
| SPEED OF VESSEL | 13 KNOTS | |
| RUDDER AREA | 212 SQ. FT. | 19,6 m². |

## TO TEST: LLOYD'S REGISTER OF SHIPPING.

| POS. | NUM. | OBJECTS | MATERIAL | REMARKS |
|---|---|---|---|---|
| ① | 1 | RUDDERBODY | FORGED-IRON | |
| ② | 1 | COUPLING-PIECE | CAST STEEL | |
| ③ | 1 | UPPER-BEARING | " " | |
| ④ | 1 | LOWER- " | " " | |
| ⑤ | 1 | UPPER BRONZE-BUSH | BRONZE METAL 86% Cu, 10% Sn, 4% Zn. | |
| ⑥ | 1 | LOWER " " | " | |
| ⑦ | 2 | KEY | " | |
| ⑧ | 6 | FLAT BAR – 50×16 | " | |
| ⑨ | 24 | COPPERRIVETS 16 m/m DIA. | COPPER | |
| ⑩ | 1 | BRONZE RING – 80×10 | BRONZE METAL | |
| ⑪ | 6 | ⅝" DIA. TAPBOLT | " | |
| ⑫ | 2 | LIGNUM VITAE-BUSH | LIGNUM-VITAE | |
| ⑬ | 4 | SREW PLUG, 1" GASPIPE-THREAD | BRONZE METAL | |
| ⑭ | 1 | UPPER BEARING RING | FORGED STEEL | |
| | | | | |

## NOTES:

1.) THE FORWARD AND AFTER PART OF THE RUDDER IS TO BE FILLED WITH SOLUTION AND SUBJECTED TO A PRESSURE OF 7,5 lbs. per sq. inch. (0,5 Atü.) IN WHICH CONDITION SAME WILL HAVE TO BE ACCEPTED BY LLOYD'S, AFTER THAT THE SOLUTION WILL HAVE TO BE REMOVED AGAIN AND THE SCREW-PLUGS TO BE INSERTED.
2) INSIDE-PIPE IN THE RUDDER IS TO BE PAINTED WITH SOLUTION.
3) ALL WELDING-WORKS ARE TO BE ACCOMPLISHED VERY CAREFULLY.
4) TAKE SPECIAL CARE, THAT THE RUDDER-STOCK IS FLUSH WITH THE RUDDER-BEARINGS (OR THE CYLINDRICAL RUDDER-POST).
5) CYLINDRICAL RUDDER-POST AND CONNECTION WITH STERNFRAME SEE SEPARATE DRAWING.

GEN BOX No 728

(78)

N.V. NEDERLANDSCHE SCHEEPSBOUW Mij. YARD No 272/73 A.R. 8661/62
SWAN, HUNTER, & WIGHAM RICHARDSON, LTD. YARD No 1561 & 1563 A.R. 8663/64.

Deutsche Werft Hamburg

24/2/38

Rules for application of E.A.W. to be complied with.
Notation to be made in the Register Book "Rudder electrically welded".

Nederl. Scheepsb. S. 272/73
SWAN HUNTER S. 1561 u. S. 1563.

15000 TO. TANKER

# SIMPLEX-BALANCED-RUDDER.

1:24, 1:12.

SKR. 401.

11. II. 1938 * 0096

P. Kachler
5. II. 38.

005377-005386-0029